

AUTOMOTIVE INDUSTRIES

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Timken developed the anti-friction bearing with tapered construction. Timken sponsored the exclusive feature of *POSITIVELY ALIGNED ROLLS*. And Timken operates its own electric furnaces to assure the most wear-resistant bearing steel ever known.

But no need to go into these technicalities. *Settle* big technical questions by featuring the Timken Bearings in your car, truck or bus. Then you are making it clear that there is utmost protection not only against friction, but against side-thrust, shock, weight, torque and speed. Timkens assure this complete wear-protection, and greater simplicity, compactness and accessibility—in differentials, pinion or worm drives, transmissions, rear wheels, front wheels, steering pivots and fans.

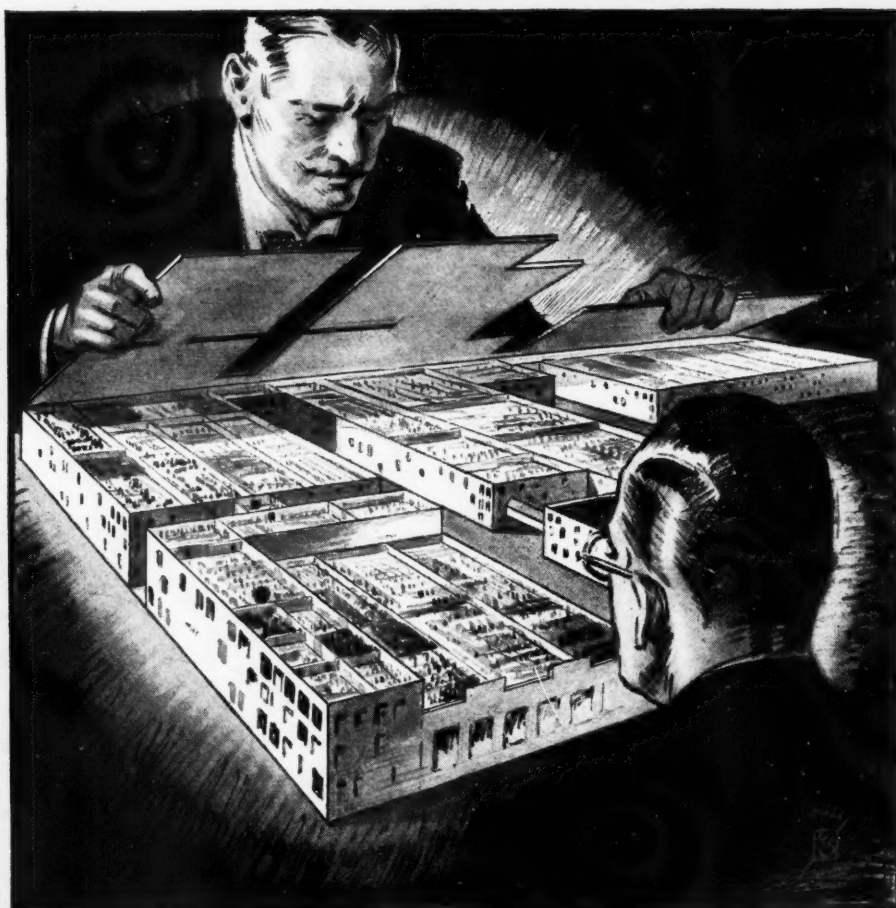
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 World's Largest Manufacturers of Automobile Body Hardware
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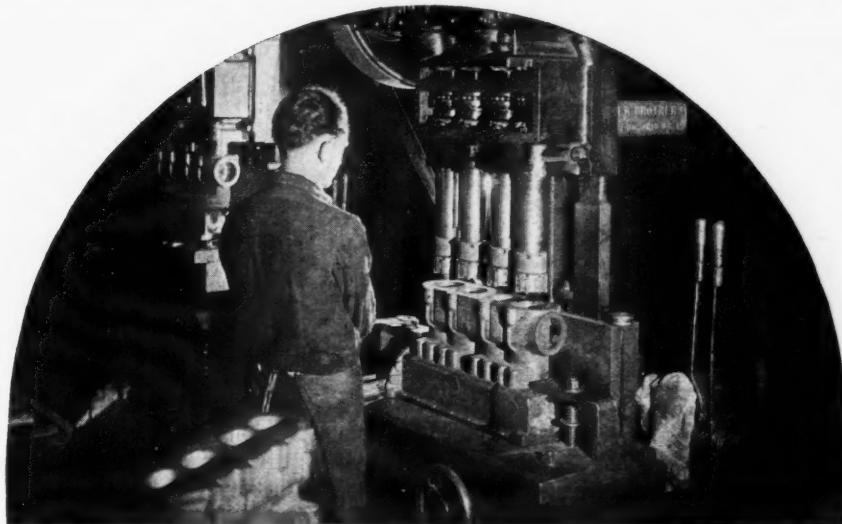
*The desirability of Fittings
 by Ternstedt now is being
 impressed upon car buyers
 through national
 advertising*

AUTOMOTIVE INDUSTRIES

VOLUME 58

Philadelphia, Saturday, April 28, 1928

NUMBER 17



Automotive Industry *Might Lead* in *Stabilizing* Employment

Effort to provide steadier work for employees considered of vital importance by many executives. Seen as factor in placing industrial relations on sound basis.

By Norman G. Shidle

GENERAL executives as well as production men are giving some very real thought to ways and means of stabilizing employment these days.

The presence at the head of a number of big automobile companies of men who came up through the manufacturing side of the business and who have spent most of their lives in close contact with workers probably accounts to some extent for the fact that the problem is getting more consideration in this industry than in some others. These men in particular point out various important reasons why stability of employment plays a dominant part in the future of automotive industrial relations, among the more outstanding they cite the following:

1. Stabilized employment means stabilized buying power among the 7,500,000 men who are employed directly or indirectly in automotive manufacturing and maintenance work. This number is large enough to be a factor of some importance when reckoning the buying power available for purchase of automotive products.

2. Stabilized employment means very considerably reduced labor turnover costs, which mount into thousands of dollars per year in many plants.

3. Stabilized employment means that the industry is meeting a very definite social obligation.

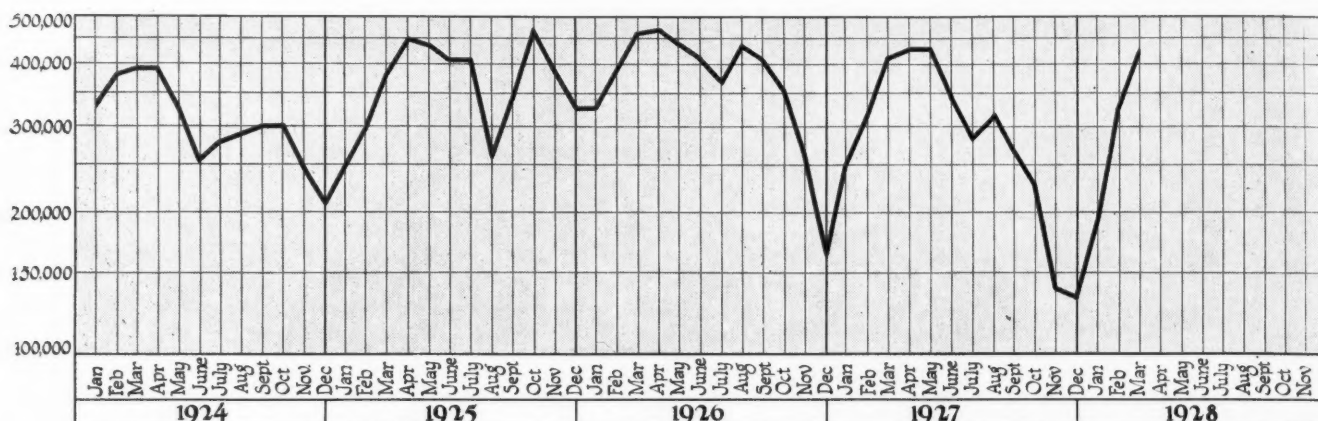
4. Stabilized employment means, not only a minimizing of labor unrest, but a positive increase in efficiency of work on the part of the average employee.

"Stabilizing of employment—making the workman sure of his job so long as he performs his work satisfactorily—means more than any other one single thing so far as keeping automotive industrial relationships on a sound basis is concerned," said the vice-president in charge of production of a big automobile plant the other day. And study of numerous individual cases as well as of views of other important manufacturing executives indicates the soundness of placing strong emphasis on this particular factor of labor relations in this industry.

While many other factors, obviously, enter into providing satisfactory relationships between management and workers, it can fairly be said that stability of employment is a basic consideration.

So far as this country is concerned, that social and economic unrest which manifests itself partly in the unsettling of industrial relations in individual plants, waxes most when there is an unusual amount of un-

Monthly Production of Cars and Trucks—U. S. and Canada



employment or when demand for workers is so great that production becomes a hectic rush rather than an ordered procedure. Either of these conditions provides instability of employment, despite the fact that they are the result of diametrically opposed economic forces.

Unrest comes to most people—and industrial workers are just ordinary average humans like everyone else—when their living routine is constantly being disturbed; the man who can adjust himself to the point where constant change becomes a routine is the exception rather than the rule. And nothing seems to upset the establishment of a comfortable living routine quite so much as wide fluctuations up and down in earnings.

Fluctuating Income Breeds Discontent

As one production executive put it the other day, "A man can become adjusted to living on earnings which vary, perhaps, from \$125 to \$150 per month without too much difficulty, but ask him and his family to adjust themselves to having \$90 one month and \$200 the next and the stage is set for the entrance of acute discontent factors as time goes on." As a matter of fact the task of adjusting his affairs to widely fluctuating income probably is a more complicated job for the average worker than is adjustment of factory facilities to fluctuating production schedules.

That executives are warranted in giving to employment stabilization the attention which they are is indicated by a study of the monthly production curve of the industry over a period of the last five or six years. The size of production fluctuations from month to month has been no less in the last two years than it was in the previous two or three; this despite the fact there has been a good bit of talk about ironing out the kinks in the sales curve for a number of years. The automobile business as at present conducted continues to be a highly seasonal business, in spite of the advent of closed cars, winter business merchandising campaigns and increased snow clearance work in many northern States.

These and other activities have tended to keep sales on a more even keel than otherwise could have been the case; that cannot be doubted. But the very definite policy adopted by manufacturers of holding production closely in line with retail sales in order to avoid overstocking of dealers apparently has offset to an appreciable extent whatever stabilizing effect

on the production curve otherwise might have accrued.

To urge production stability to provide continuous employment to workers at the expense of saddling the already heavily burdened dealer with large stocks would, of course, simply be to advocate robbing Peter to pay Paul. Like most economic problems of the automotive industry, this one presents a need for constructive attack in a detailed way on several sides rather than for the seeking of any patent nostrum. The problem can be—and for that matter is being—attacked from several angles, as follows:

1. Better market analysis on the part of factories. Continuance of the statistical and economic analysis work which has been developed to a high point in a few factories. Scientific quality is the factor most to be emphasized in carrying forward efforts of this kind.

2. Better understanding of the meaning and possible value of results of economic and statistical studies by general and sales executives, looking toward the end of enabling these executives actually to repose sufficient confidence in those studies to use them as a basis for practical planning of production and merchandising.

3. Distribution of stocks to dealers in such a way, perhaps, as to make the average stocks lower for the year but less wide in fluctuations. Something of this kind might be possible if the statistical basis of sales plans were laid carefully enough in the beginning.

4. Strenuous attempts to exercise a greater degree of foresight in preparation and announcement of new models; more careful handling of distribution and production balances involved in changing over from one model to another. Some plants have been able to take care of this matter far more smoothly than others; it is, in the opinion of several important executives, largely a matter of careful thinking rather than of particular methods.

Responsibility on the Leaders

The possibilities of working toward employment stabilization already mentioned, it will be clear, all apply to the actions which come within the purview of general executives of factory organizations—and there is no blinking the fact that on the shoulders of the men at the top must rest the major responsibility for progress along these lines. It is only the chief

executive who can influence matters of the fundamental character which underlie all other attempts toward stability.

The manufacturing man himself, on the other hand, can alleviate conditions materially in many cases by activity well within his own sphere of operation. He is doing this today in various ways. For example:

1. He can keep in his mind the ideal of a stabilized working force, so far as a large proportion of his factory force is concerned.

2. He can cut down days and hours before making major inroads into the total number of men employed, thus providing some employment for a greater number of men rather than full employment for a few. His gain comes in lower labor turnover costs, and greater loyalty and consequently better work from the men.

3. In general conferences with chief executives or with other department heads he can emphasize strongly the production problems involved in sudden design changes, rapidly fluctuating schedules and haphazard sales planning.

Every general and production executive in the automobile industry isn't worked up about the idea of providing stabilized employment. Most will agree, if questioned, that provision of stabilized employment is a desirable end, but as a matter of day-to-day practice, a certain number doesn't think there is much chance of making any real progress along these lines.

There is another and constantly growing group, nevertheless, that not only considers the end desirable in a theoretical sense but which considers it necessary of attainment as a part of any intelligent industrial relations operation for the industry as time goes on.

This latter group includes the chief production executives of at least eight or 10 of the biggest car plants in the industry and is responsible for the practical work which now is being done in this direction. "Poor workmanship," says one of these men, "is a direct result of dissatisfied employees, and instability of employment helps as much as any other single factor to bring about dissatisfaction."

"When men are out of jobs," says another, "then communism, socialism and other nostrums get discussed quite frequently as possible ways out of unpleasant conditions. When men are at work, however, the natural tendency is to forget the various elements of the higher foolishness in the presence of a steady income and satisfactory working conditions."

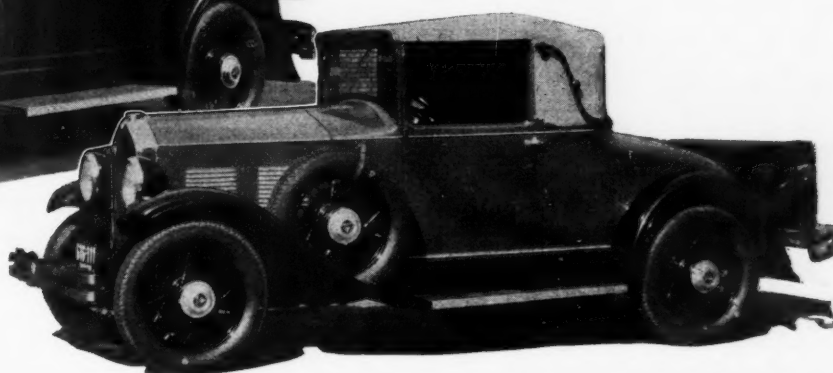
The existence of a certain number of congenital "floaters" among automotive workers is well recognized by all of these executives. That group they aren't worrying about one way or the other. Their aim apparently is merely to provide as steady employment as possible for all of the men who show any signs of wanting steady work and thus help to build loyal workmen rather than encourage a man to become a floater by force of circumstances which deny him steady work at one place.

And despite the continued wide fluctuations in total automobile production from month to month in the last few years, it is interesting to note that in a number of plants the employment curve is very definitely more stable today than it was three, four and five years ago. In those particular records there lies definite evidence of constructive achievement on the part of a number of production men and executives of the automotive industry.

Jordan Introduces "Cross Country Six" Line



Above—The new Jordan Cross-Country Six sedan



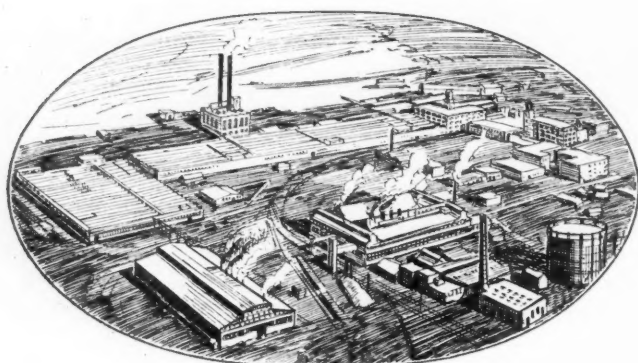
Below—The Cross-Country "Tomboy" model

THE Cross Country Six line has replaced the Little Custom Jordan of the Jordan Motor Car Co., Inc., Cleveland, Ohio. The engine has a bore $\frac{1}{8}$ in. larger, the cylinder dimensions now being $3\frac{3}{8}$ by 4 in. and the piston displacement 214.71 cu. in.

By moving the radiator forward about three in. and correspondingly lengthening the hood, the car is given an appearance of much greater length. To further carry

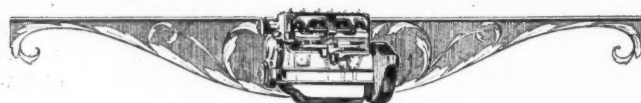
out this effect of increased length the hood is now made with a single tier of horizontal louvres instead of with vertical ones, and a narrow belt line is used on the bodies.

The cars now have side lights and the headlights are shorter. A radiator cap of small height is provided. All of the color schemes are new. Prices remain the same as for the Little Custom line.



Financial Progress of Continental Motors—1921-1927

Year	Book Value Capital Stock	Net Working Capital	Ratio Current Assets to Cur- rent Liabilities
1927	\$20,569,361	\$10,743,134	7.4:1
1926	21,035,135	11,153,377	7.1:1
1925	20,812,616	11,813,061	5.1:1
1924	19,409,056	10,668,109	8.2:1
1923	18,746,030	5,914,972	2.0:1
1922	16,742,375	6,107,778	2.5:1
1921	15,470,203	6,320,555	2.6:1



At the Chicago Automobile Show in January, 1903, the awe-struck crowds surrounded the great new three-cylinder Pope Toledo (the "nickel-chrome car") and were quite unmindful of a four-cylinder engine mounted in a booth in a distant corner. It took courage and not a little of the gift of prophecy to devote a slender capital to the development of a power-plant so remarkably different from the one and two-cylinder engines then in use, but there were two men in Chicago with that courage and vision, and they laid the foundation for the Continental Motors Corp., now the largest exclusive engine-building company in the world.

The partners were Ross W. Judson, now president of the corporation, and A. W. Tobin, and their capital was approximately \$2,000. Orders came in for the new engine and caused a move to larger quarters—9900 sq. ft. in the Lakeside Power Building, a startling contrast to the 75½ acres of ground area now covered by the plants in Muskegon and Detroit. On May 3, 1904, the co-partnership was succeeded by the Auto Car Equipment Co.

\$2,000 Started Motors to

*That was initial capital of en
of more than \$36,000,000.
days of company has paid*

By John C.

of Illinois with a capital of \$6,000, and the following year the name was changed to Continental Motor Manufacturing Co., to correspond to the name of the product.

If growth in the early years was slow, it kept step with the industry, and the upward trend was the more significant because expansion was financed almost entirely from earnings, a policy steadily adhered to in all the following years.

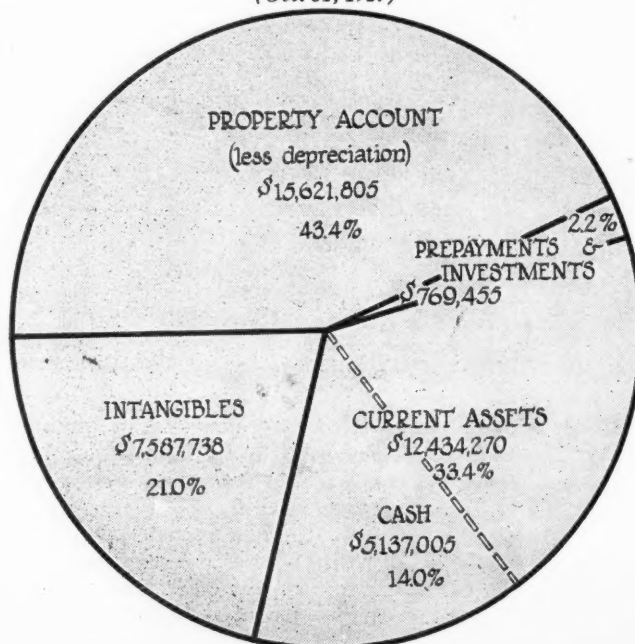
What this policy has meant in figures may be inferred from the fact that net earnings after interest, depreciation and taxes, totaled approximately \$28,344,000 in the period for 1906 to 1927, inclusive, while only \$12,524,000 were paid in cash dividends, leaving more than \$15,500,000 for reinvestment in the business.

But although cash dividends were inconsiderable in the first 10 years, the stockholders who were fortunate enough to acquire an early interest and who stayed with the company were richly rewarded, for stock dividends of staggering size were paid frequently and established the capital structure for the later more liberal cash disbursements. An accompanying table shows the stock dividends, which reached a par value of \$11,870,380 in the period covered.

Up to June 30, 1906, a total of \$47,100 of common stock had been issued and the first stock dividend, on Sept. 29, 1906, increased the outstanding capital to \$56,500. Previously, however, on Aug. 22, 1906, the corporation having moved its plant to Muskegon, Mich., the Continental Motor Mfg. Co. of Michigan was organized to succeed the Illinois corporation, the stock exchange being share for share.

In the following years there were numerous stock changes to meet the growing capital needs of

Division of Assets (Oct. 31, 1927)



Continental Success

enterprise which now has assets
Investment of \$100 in early
return of \$27,039.86

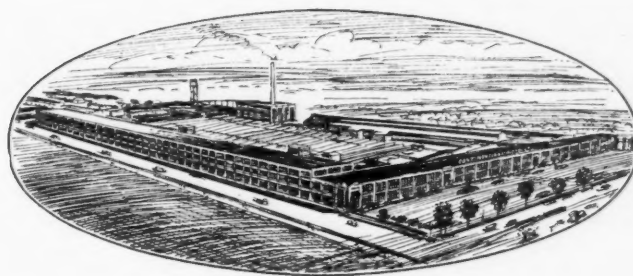
Gourlie

the company, and to pass on to stockholders the fruits of the expansion of business. By 1912 there were outstanding \$940,000 of common stock and \$470,000 preferred stock. More stock dividends and an issue of serial notes brought the capitalization late in 1916 to \$3,840,860 of common stock, \$472,300 par value of preferred, and \$1,000,000 in notes.

A reorganization was then effected, the Continental Motors Corp. being chartered under the laws of Virginia, and \$3,500,000 of 7 per cent preferred stock and 1,452,258 shares of \$10 par common stock issued. Stockholders of the predecessor company received for each share of common stock, three shares of the common of the new company and \$5 in cash. From the sale of the preferred stock and 300,000 shares of the common of the new corporation, additional working capital was obtained and the preferred stock and serial notes of the old company were retired.

In 1920, \$5,000,000 serial gold notes were issued and later the preferred stock was retired, the capital account standing at 1,760,845 shares of no par common, the present amount. In 1924 a bond issue of \$7,500,000 bearing 6½ per cent interest was brought out to retire the gold notes, pay bank indebtedness and provide additional working capital. Operations of a sinking fund have brought the outstanding amount down to the present level of \$6,548,400, constituting the only obligation prior to the capital stock.

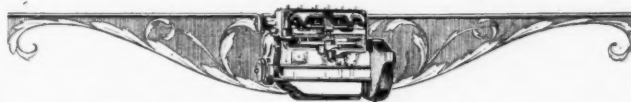
Mr. Tobin died during the early



Record of Stock Dividends

	Per Cent	Stock Dividends Par Value Distributed
1907	20	\$9,400.00
1908	50	39,900.00
1910	60	87,960.00
1911	100	234,000.00
1913	*200	940,000.00
1916	200	2,877,400.00
1917	†200	7,681,720.00

* 100% dividend in common stock and 100% in preferred stock.
† Includes the exchange of 3 shares of common stock of new corporation and \$5 in cash for 1 share common stock of old company.

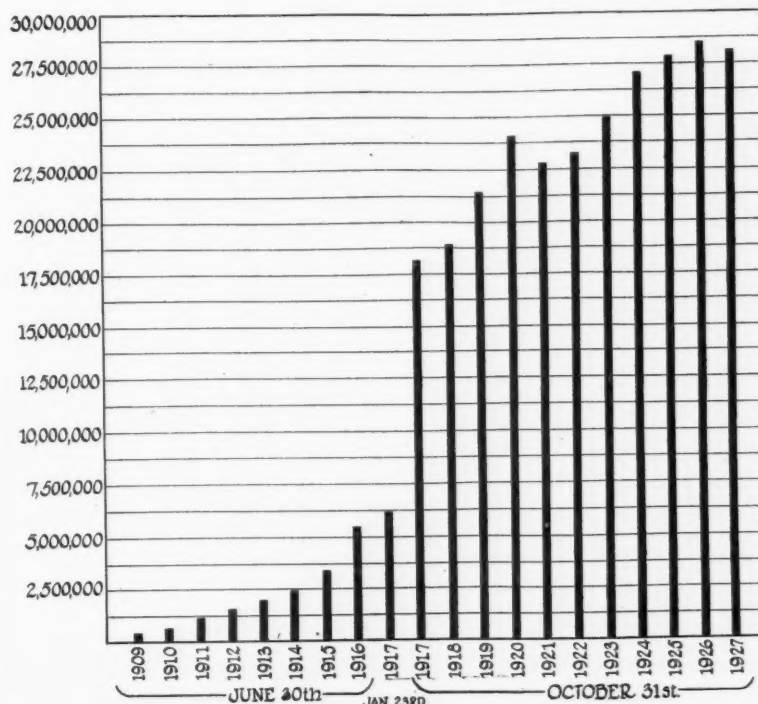


years of the company. In 1916 W. R. Angell joined Continental and has since been very closely associated with Mr. Judson in the management.

Although the earnings of Continental Motors have fluctuated somewhat over a period of years, the trend has been unusually stable for the industry, and sound financial policies have reduced the effects of the fluctuations to a minimum, as is shown by the chart covering net worth of the corporation. Net worth gained rapidly in the earlier years of development and since, in line with stabilization of the industry, has pursued a more moderate course.

Equipment makers, experience has abundantly proved, suffer more than car and truck manufacturers in periods of deflation or sudden cessation of demand for automotive products. The ability of Continental to keep on an even keel is therefore a tribute

Net Worth, 1909-1927



to the management.

Continental is, of course, largely dependent upon automotive business for satisfactory earnings, yet in recent years it has vigorously pursued a policy of diversification and now sells a good proportion of its products for engine installations in non-automotive industries. This contributes to stability and to the support of business at times when car and truck manufacturers are retrenching.

The chart showing earnings and dividends not only pictures the extent to which profits have been plowed back into the business, but brings out the fact that in only one year since 1909 was a loss sustained. In virtually every other year reasonably satisfactory profits were earned.

A conservative depreciation policy, moreover, has held down the plant and property account on the balance sheet. In recent years, depreciation charges have averaged around \$800,000 yearly. Partly in consequence of this policy, plant and property (less depreciation) grew only \$1,407,775 in the period 1921 to 1927, standing at the end of the former year at \$14,214,030 and in 1927 at \$15,621,805. In the same period there was a surplus after dividends of \$6,408,899.

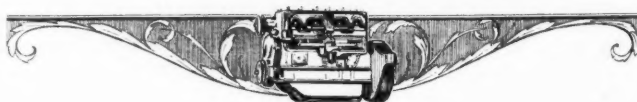
The table shows how net working capital was increased during the period, involving a better ratio of current assets to current liabilities. This was attained largely through increases in cash holdings, which grew from \$1,205,133 at the end of the 1921 fiscal year to \$5,137,005 at the end of the 1927 year. Retirement of bank loans was also an influence toward the betterment of the current ratio. At the same time inventories

Original Investment of \$100 Returns \$27,039.86

ONE share of the stock of the Auto Car Equipment Co., par value \$100, is represented today by 1382.4 shares of the Continental Motors Corp. This number of shares at the present quotation of about \$11 would have a market value of \$15,206.40.

In addition to this, cash dividends paid to date have meant a return of \$11,833.46 on each share of the original \$100 par stock.

Adding the cash dividends to the present market value of the stock, it is seen that each original \$100 investment has returned the investor a total of \$27,039.86, or a 270-time increase.



were reduced from \$8,414,522 to \$5,590,026.

Surplus rose from \$4,779,066 at the end of 1921 to \$10,848,649 at the end of 1927 and total assets rose from \$30,797,726 to \$36,413,268.

As will be seen from the diagram of the latest balance sheet of the corporation, the so-called intangible items are quite large. They are divided into patents, good-will, trade name, etc. (\$5,908,317); unamortized discount and expense (\$628,796); unabsorbed engine development cost (\$616,772), and unabsorbed preparation cost (\$433,853).

Yet the sum of these items is approximately the

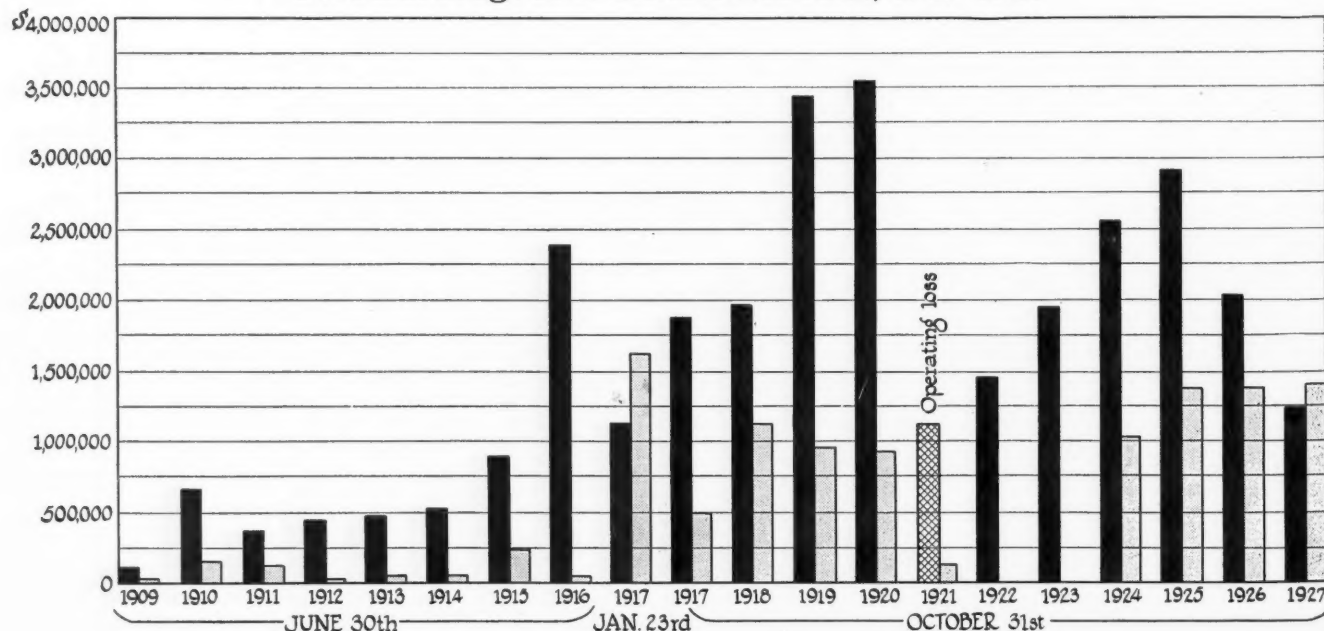
same as for a number of years, with the exception of the addition of unabsorbed engine development cost, undoubtedly arising from work on the single sleeve valve engine. The segregation of this item, rather than entirely absorbing the cost from current earnings, is manifestly reasonable, since the corporation has not yet had the opportunity to realize on its investment in the new engine, which, however, represents a potential source of great earning power. Part of the development cost has been absorbed.

Furthermore, when all the intangible items are excluded, the net tangible assets or book value applicable to the capital stock is unusually high, for an automotive concern, in relation to market price of the stock. The book value per share of stock is \$11.68, or more than the recent price of the stock on the exchange.

It is no more than fair to add that some of the items here considered as intangibles might be included in an-

(Continued on page 657)

Net Earnings and Cash Dividends, 1909-1927



Just Among Ourselves

Many an "Extra" Between F. O. B. and the Buyer

RETAIL passenger car prices have been interesting phenomena in recent years. The relation between the nationally advertised f.o.b. price and what the customer actually pays for the car is quite indefinite and varies widely from car to car—and even between one model and another of the same make in some instances. While many manufacturers profess deep concern with the holding down of retail delivered prices to the lowest possible level, others ship to the dealer with every car a number of accessories which he must buy and which he must sell in addition to those included in the f.o.b. price, thus making spreads as high as \$350 to \$400 in some instances between the nationally advertised f.o.b. price and the actual retail selling price. These high spreads are due partly to extras added by dealers, to be sure, but the handling charges put in by the retailer are not always responsible for the large spread by any means.

* * *

Up to the Dealer to Explain Spread

THERE is this to be said, of course; while the adding of accessories by the manufacturer in addition to those included in the f.o.b. price does increase the spread, the customer basically is getting his full money's worth. He is receiving full value in return for the extra dollars spent for these accessories, which come as an integral part of the car from the builder although not included in the advertised f.o.b. price. The problem comes to the dealers, however, of finding satisfactory means in certain

instances of explaining clearly to the prospect the reason for the great divergence between the advertised and the delivered price. A manufacturer who included all of this added equipment in the advertised price, however, might justly feel himself at a competitive disadvantage with those who did not. Dealers undoubtedly have been at fault in many cases in loading the delivered price more than necessary to take care of actual handling charges, freight and delivery, but manufacturers also have some share of the responsibility to bear for the wide spread which appears in a number of instances. And behind it all is the used car angle involved in most present-day sales.

* * *

1928 Looks Like a Speed Year

THE Indianapolis race looks as though it were going to get even more interest and attention from stock car engineers this year than it has in the past. The Marmon name will be in the race again for the first time in many years, while rumors persist of entries carrying the names of two or three other well-known stock cars. Now that the world's automobile speed record for one mile is back in the United States again, 1928, with only four of its months gone, bids fair to stand out as a year of outstanding motor car speed achievements. So many new records are being attempted and achieved in the motor vehicle, airplane and motor boat fields that the man in the street almost needs a personal statistician to keep up with the last word in accomplishment of vehicles powered with internal combustion.

The End of Color in Cars is Not Yet

HAVE automobile makers gone the limit yet in the application of color to cars? Probably not by a good ways, if the experience of other industries is any guide. When color becomes a selling point for typewriters, it is shown to have possibilities far beyond those usually attributed to it. Bodies, fenders, wheels—to all of these color has been applied in varying combinations and harmonies. Tire covers have been painted to harmonize or enhance the outward car appearance, but not nearly so frequently as they probably will be as time goes on. Colored windshield wipers, colored body hardware, colored interior trim, more color in bumpers, colored trunks, etc., built into a car originally as a part of a harmonious whole all are possibilities in some motor cars of the future.

* * *

Increased Earnings for Most Companies

PROFITS as well as volume have increased for many automotive firms this year. First-quarter statements now coming through show gains over last year in net earnings in a majority of cases, the advances being quite substantial in some instances. Parts as well as vehicle companies are sharing in the betterment, a single week's announcement showing first quarter gains over the similar period last year for such organizations as Electric Auto-Lite, Eaton Axle & Spring, Marmon, Hupp, General Electric, Wire Wheel, Mullins Body and several others. Thus, in some reasonable measure at least, the optimistic predictions made earlier have been fulfilled.—N.G.S.

Laminated Phenolic Gears Show Safety Factor of 15 to 20

Much higher than previously supposed, Prof. Earle Buckingham tells American Gear Manufacturers Association in session at Rochester. A. F. Cooke elected to presidency.

By P. M. Heldt

ONE of the most striking bits of information brought out at the twelfth annual meeting of the American Gear Manufacturers Association, held at Rochester, N. Y., April 19 to 21, was that the factor of safety of gears made of laminated phenolic materials, when their rating is based on the safe working stress formula adopted by the association a year ago, instead of being between 3 and 4, as previously supposed, is actually between 15 and 20.

This was brought out in a report of Prof. Earle Buckingham of Massachusetts Institute of Technology, relating to tests made on pinions of two different grades of these materials, on the Lewis gear testing machine. Incidentally, this is one of the first tangible results of the research work which is being subsidized by members of the association.

The meeting was one of the best attended in recent years, which was probably accounted for by the fact that Rochester is centrally located and comparatively easily accessible from all centers of the industry. New officers of the association were elected and the results of the election were announced at the banquet which was held at the Hotel Seneca on Friday evening. A. F. Cooke, vice-president of Gears & Forgings, Inc., was elected president; B. F. Waterman, of the Brown & Sharpe Mfg. Co., first vice-president; E. W. Miller, chief engineer of the Fellows Gear Shaper Co., second vice-president, and Warren G. Jones, president of the W. A. Jones Foundry & Machine Co., Chicago, treasurer. T. W. Owen, 3605 Euclid Ave., Cleveland, O., remains as secretary. The next meeting of the Association will be held in Buffalo, N. Y., early in October.

The Burden of Progress

E. J. Frost in his presidential address referred to the effects of general economic trends. He said the gear industry must bear its share in the general progress of reduction of costs to the consumer, so long as such reduction is legitimate and can be brought about by increased efficiency of men, methods and machines. Quality must not be sacrificed to quantity, but increase in production must be obtained through the better education of producers, through elimination of wastes that are common to nearly all shops, and by creating an active interest among workmen, making each man feel that he is a definite unit in a coordinated organization. The office, too, should bear its share, by buying satisfactory materials at right prices, by seeing that materials are in the shop on time and jobs started in their

proper sequence, and by giving the maximum of care to the selection of the most efficient machine tools and small tools, furnaces and other equipment.

Mr. Frost said he believed sincerely in the wisdom of the adoption of some plan to minimize industrial accidents, to prevent disease and to provide proper first aid and nursing service. Many costly mistakes are made because workmen should be wearing glasses, and often the man knows nothing of his need until his eyes are examined.

Industrial Relations

"Good will and peace of mind among workmen," he said, "are wonderful assets in any manufacturing plant, and these things have to be cultivated (if not actually earned) by the management through relationships that are founded on mutual understanding and a working adoption of the Golden Rule. Or, as Charles Schwab puts it, 'today cooperative action is essential as a means of advancing any industry.' The day of the individualist, when personal interest overshadowed all other motives, has passed. It has been forcibly demonstrated that individual prosperity depends absolutely upon the success of the industry; that no individual can prosper permanently at the expense of the industry."

Most of the technical standardization committees which reported at the meeting had only progress to report and no definite recommendations to make at the time. The work of some of these committees, especially those handling subjects connected with automotive gearing, has been practically completed.

F. E. McMullen of the Bevel and Spiral Bevel Gear Committee presented a system of nomenclature for bevel and spiral bevel gears. This system comprises eighty-nine separate items and is presented in six parallel columns containing the number, the term, the symbol or abbreviation, a definition of the term, a formula for determining the dimensional value of the term (if any), and an illustration. The report was accepted and Mr. McMullen was commended for the painstaking work he had done on the system.

J. L. Williamson of the Spur Gear Committee said the committee after having completed standardization of backlash in industrial gears had been considering the standardization of backlash in automotive gears. In the discussion which followed it was brought out that the best backlash in an automobile transmission depends upon the characteristics of the engine with which the transmission is combined. E. J. Frost said

a backlash of from 0.005 to 0.008 in. was the most accepted practice in automobile transmissions. A. W. Copeland said it was his opinion that the backlash should be held just as close as the workmanship would allow. R. P. Johnson said in the four-speed transmission with internal gears of the Warner Gear Co., they endeavored to hold the backlash down to practically nothing, while in some installations of conventional transmissions a change in the backlash from nothing up all the way to 0.020 in. had no effect on the noise. After some further discussion it was decided to drop the attempt to standardize backlash of automotive transmissions.

Keyway Standards

R. B. Zerfey, reporting for the Keyways Committee, said they proposed to add a footnote to their keyway standard explaining wherein it differed from the A. E. S. C. standard. Among the subjects now before the committee is that of key materials. It was suggested that the Library Committee print the S. A. E. Standard for splined shafts as well as the proposed A. E. S. C. standard for Woodruff keys. In connection with the mention of items before the committee, Chairman Waterman of the General Standardization Committee announced that the general standardization program was being revised and that members of the various committees would be advised of the new plans in the near future.

T. C. Roantree, chairman of the Non-Metallic Gearing Committee, said the committee was working on a list of preferred pitches. In collecting data on which to base this list it was found that so far there had not been established any general relationships between diametral pitches, face widths, pitchline velocities and horsepower ratings. A scheme is being considered whereby the arbitrary relation of a certain range of face widths, based on general practice, will be established for certain ranges of horsepower ratings, and with these established, a table of preferred pitches can be more readily worked out. The report was accepted as one of progress.

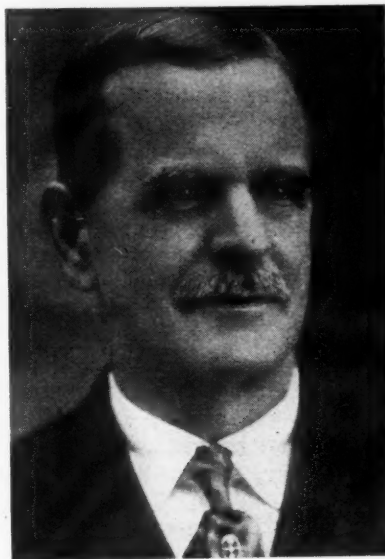
G. M. Bartlett, chairman of the Sprocket Committee, said the committee was working on an additional series of chains, to be known as the Heavy Series, with heavier side links, to meet a demand in the industry. Chain manufacturers are willing to produce these chains to meet the demand, and, in fact, some of them are producing the chains already.

Gear Tooth Profile Modification

H. E. Eberhardt, chairman of the Tooth Form Committee, in his report said that at the Jackson meeting a year ago the full depth tooth recommendations for both $14\frac{1}{2}$ and 20 deg. pressure angle were adopted. Certain changes in terms and symbols were suggested by the Nomenclature Committee which were about in shape to make the standard ready for printing.

At the Montreal meeting last Fall, Mr. Hall of the Brown & Sharpe Mfg. Co. ably analyzed the hob modifications of five different makes of generating hobs and presented a method of treatment whereby the effects of these modifications upon generated teeth may be readily determined; also, conversely, the amount of basic rack modification necessary to obtain a desired tooth form modification or "ease-off." The committee recommended that some method such as that of Mr. Hall be adopted to aid in determining a standard basic rack modification, as the proper and scientific way to proceed.

To obtain immediate results and to discourage further confusion, it was suggested that where desired, an average value of the present modifications be used, with tolerances sufficiently large, both plus and minus, to include all the modifications in use at present. For example, the variations beyond the $14\frac{1}{2}$ deg. side of the five hobs are 2 deg. 30 min., 3 deg., 4 deg. 30 min., 9 deg., and 15 deg. 30 min. The average of these is 6 deg. 54 min. The average of the largest and smallest values is 9 deg. which, with a 6 deg. 30 min. allowance, includes five hobs. The hob manufacturers are willing to change their present modifications to suit the gear users' desires and it is therefore in order for the association to act. There was considerable difference of



A. F. Cooke, newly-elected president of the American Gear Manufacturers Association. He is vice-president of Gears & Forgings, Inc.

opinion with respect to this last suggestion, and no action was taken on it.

Chester B. Hamilton, chairman of the Metallurgical Committee, said the committee proposed a recommended practice for forged and rolled alloy steels as a companion specification to the similarly-named one for carbon steels, which was presented last year to the American Engineering Standards Committee. The alloy steel specification was not presented for action at this meeting but only for discussion, and will be put in a form to be acted upon at the fall meeting. In the meantime it will be discussed also by a subcommittee of the Sectional Committee on Gear Materials of the A. E. S. C. After action has been taken on it by the A. G. M. A. next fall, it will be formally presented to the A.E.S.C.

In the absence of E. W. Miller, A. G. M. A. representative on the A. S. M. E. Research Committee on Gears, Professor Buckingham reported on some work done on the Lewis gear testing machine at Massachusetts Institute of Technology. Two series of tests have been carried out on the machine recently, one on a cast-steel gear which was run together with pinions of different materials, including aluminum. The other series was made on a 60-tooth pinion of laminated phenolic material running together with a 120-tooth cast-iron gear, the pitch being 10.

The most interesting fact developed was that whereas the factor of safety of non-metallic gears when carrying their rated load according to the A. G. M. A. formula is generally assumed to be between 3 and 4, the tests showed it to be about 15 for one brand of this material and 22.5 for another. The explanation of this discrepancy lies in the great elasticity of non-metallic as compared with metallic materials. With metal gears it is

generally not safe to assume that there is more than one pair of teeth in contact. Inspection of the samples tested showed that three pairs of teeth were in contact at all times. Moreover, when three teeth are in contact simultaneously the strength is more than trebled, for whereas with contact on a single tooth the contact may be at the top, which places the greatest strain on the tooth, with simultaneous contact at three teeth, if the contact is at the top on one it will be at the pitchline on the second and near the root on the third. Hence the strength will be multiplied from four to five times over that with single tooth contact.

Effect of Resilience

With the non-metallic test gears the possible elastic deformation is about $1/64$ in., which is far greater than the limit of error in the gears. It was found, however, that when the gears ran at near the breaking load, the teeth of the cast-iron gear gouged into the flanks of the non-metallic pinion. This, Professor Buckingham said, could be prevented by using a longer addendum.

Breaking tests made at speeds of from 250 to 2500 ft. p. m. pitchline velocity showed that the strength varies with the speed very closely in accordance with the A. G. M. A. formula, the curve of breaking loads having a form very similar to that obtained by plotting values calculated by means of the formula for safe working stress.

Another conclusion drawn from the results of this series of tests is that the strength of non-metallic gears is not directly proportional to the circular pitch. The length of contact, which determines the number of teeth in contact simultaneously, is considered an important factor.

One of the members asked Professor Buckingham whether the tests on the Lewis machine had shown any difference in regard to quietness of operation as between gears with 15 deg. and 20 deg. pressure angles. The answer was that accuracy of teeth is the all-important factor determining noise, overshadowing by far any effect of pressure angle, and that in tests with gears of different pressure angles, even if one showed definitely greater quietness than the other, one would not be safe in ascribing that to the difference in pressure angles as long as it was not certain that the limits of accuracy were exactly alike.

Gear Lubrication

G. A. Round, assistant chief engineer of the Vacuum Oil Co., gave a talk on "Lubrication of Automobile Transmissions and Rear Axles." Mr. Round said of the various problems facing the lubricating engineer in connection with automobile lubrication, that of the protection of the working surfaces was one of the easiest. Most of the wear is due not to lack of lubricant on the wearing surfaces but to misalignment of parts and to foreign material in the lubricant. Another difficulty was due to neglect of their cars by owners. He had been out driving recently with a friend and had been led to remark that it sounded as though the rear axle was dry—when had it been lubricated last? The owner replied that so far as he knew it had never received any lubricant since it came from the factory. Inspection of the speedometer showed it to register 27,000 miles and the rear axle was found to be practically dry, the lubricant remaining in it being of the consistency of tar.

There are some real problems in connection with automotive lubrication, and one of these is that of leakage. This, however, cannot be controlled entirely by means of the lubricant, design being a far more impor-

tant factor. When a transmission case is refilled with oil and the car is then started up, there will be an increase in the volume of the oil due to foaming, and as a consequence the level of oil in the case will rise. Mr. Round displayed a table of test results showing that for otherwise similar conditions the rise in level is different for different oils.

A more important factor, however, is the design of the gearcase. In one instance where the gearcase was very compact and held only a quart of oil, the level rose $1\frac{7}{16}$ in. or practically to the overflowing point with an oil that foamed strongly, while in another instance the rise in level amounted to only $\frac{1}{4}$ in.

Leakage from rear axles is more serious than leakage from transmission cases, as in many instances the oil that leaks out of axle housings gets onto the brakes and renders these ineffective. There is less increase in level in the rear axle than in the transmission, because there is less agitation of the oil in the former. Much of the trouble is due to poor felt washers. This is an item on which purchasing agents are inclined to save, and poor felt serves as a wick rather than an effective dam. Grease is sometimes used to remedy leakage troubles, but it introduces other difficulties. It does not flow once it gets beyond the range of influence of the gears, and it clogs the felt washers.

In general the rotation of the differential drive gear throws oil against the top and forward wall of the center housing, and in one particular design it was found that the oil adhering to the upper part of the housing would drain off on the sides into the axle tubes, causing an excessive amount of oil to enter these tubes and leakage to occur. This was prevented by providing baffles extending from the inner sides of the differential bearings to the top of the housing.

Rear Axle Lubrication

Rear axle oil must be sufficiently cold-proof that it will follow the gear immediately when starting in cold weather. Otherwise there will be "tunneling" and consequent trouble. There is a tendency toward straddle-mounting of rear axle drive pinions, and while this has its merits, it introduces difficulty in connection with the lubrication of the bearing ahead of the pinion. Oil from the rear axle supply cannot readily enter the bearing housing on the forward side of the housing when there is a bearing-supporting wall behind the pinion. Some makers have sought to solve the problem by providing separate means of lubrication for the forward bearing, such as a grease cup, but this is not very practical as it will be neglected by the owner.

A good many people believe that gears can be quieted by a suitable lubricant, and what is sometimes used for this purpose was shown recently when a sample was sent to the speaker's firm for analysis by the Aberdeen Proving Grounds. This had been purchased to reduce gear noises but had proved unsatisfactory because it seemed to promote rather than reduce wear. It was found to consist of 75 per cent cylinder oil and 25 per cent ground mica and asbestos, both of the latter excellent abrasives.

There had been some complaint regarding hard gear shifting in cold weather. This again was largely a matter of design. If lubricants were so compounded that they made gear shifting easy on all cars in the coldest weather they would be less satisfactory from other points of view. A survey had been attempted to determine what was the limit of permissible shift lever resistance, but the results were quite inconsistent.

One of the factors deserving some attention is the

life of gear lubricants. Such lubricants generally become heavier in use, losing about 5 per cent of their viscosity at 200 deg. Fahr. in 1000 miles of driving. It is therefore important that drain holes be provided in cases so that the lubricant can be drained out and renewed once or twice a year. The crankcase of one popular passenger car until recently had no such drain hole, and very few rear axle housings have one.

C. E. Skinner, assistant director of engineering of the Westinghouse Electric & Mfg. Co. and chairman of the American Engineering Standards Committee, presented an address on "The Value of Research to the Present-Day Manufacturer." Mr. Skinner referred to research in extremely wide variety and forms of application, from the so-called testing and trouble shooting to the fundamental researches which endeavor to weigh and analyze the stars. He pointed out that no manufacturer can expect to keep abreast of present-day progress of industry except by the utilization of the results of research carried on either by himself or by others. In fact, successful results obtained in industrial research, while of primary value to the group controlling it, are of ultimate value to all industry.

Mr. Skinner concluded his address by saying that research intelligently directed and applied is of value to the present-day manufacturer; in fact, it is essential to his very existence. This is true whether it be undertaken for any one or for all the following reasons:

- To cure trouble.
- To anticipate and prevent trouble.
- To improve the quality of materials or products.
- To develop new processes, materials or products.
- To develop new uses for existing products.
- To effect savings.
- To abate nuisances.
- To develop new products to meet an existing market or to create new markets.
- To assist in standardization.
- To aid in perfecting new materials or devices.
- To develop better customer and public relations, and last, but not least, to add to the sum total of human knowledge which not infrequently results in material and cultural advances of the most profound import to all mankind.

Tooth Contact in Worm Gears

J. C. O'Brien of the Pittsburgh Gear & Machine Co., read a paper on Contact of Standard Worm Gears. Mr. O'Brien said that while a number of writers had dealt with the subject of the contact of worm wheels, they generally assumed worms of special design or unusual proportions. In his treatment of the subject he used for purposes of illustration a worm selected from the range of sizes standardized by the A. G. M. A. Among the factors discussed were pressure angles in off-center planes, the boundary of contact, the face width of the wheel, the normal pressure angle, the height of teeth and the location of the teeth with respect to the pitch surface plane.

Mr. O'Brien said that when it is desired to improve contact conditions over those obtained with standard gears, when the gears operate in one direction only, this may be done by increasing the diameter of the worm wheel on the high-pressure-angle side of the face, and reducing it on the low-pressure-angle side; or by shifting the worm toward the low-pressure-angle side, thus offsetting the worm with respect to the face. These measures are particularly effective in the case of triple and quadruple thread worms of the larger pitches. When the speed of the worm is high, a slightly nar-

rower faced wheel will be found advantageous, particularly for the larger pitches of quadruple thread.

On Friday afternoon a visit was made to the Gleason Gear Works where, after lunch had been served, the visitors were shown the various lines of machines in regular production as well as some experimental work under way. A good deal of interest was shown in a new four-spindle spiral bevel gear roughing machine which is being built to special order for a large manufacturer of popular-priced cars whose works are now being reequipped. This machine is of the continuous type, making one revolution around the vertical axis during the time required for roughing one rear axle gear. It has a capacity of 1300 crown gears in 24 hours and one workman can operate three of the machines. Another machine on which a great deal of a development work has been done, but which is not yet in shape for production, is a bevel gear hobbing machine.

Continental Motors

(Continued from page 652)

other classification without sacrifice of conservatism. The preparation costs, as a matter of fact, are covered by contracts and are in that view liabilities of the company's customers, so it is only in deference to what appears to be the prevailing statistical practice that the present grouping of intangibles was made. With the exclusion from intangibles of the preparation costs, the book value of the shares is well over \$12.

Net earnings for the company last year were \$1,248,831, or 71 cents a share on the stock, a reduction from the 1926 total of \$2,026,000, or \$1.15 a share. The comparatively poor showing in 1927 was largely due to unsatisfactory conditions in the first half, the last six months accounting for 63 cents of the entire earnings for the fiscal period. It will be noted that with a fiscal year ending Oct. 31, the first half takes in the four months that are normally the least profitable for any automotive concern. In the past two years development of the single sleeve valve engine has absorbed a part of earnings.

In view of the prospect that the single sleeve valve engine will be installed in a new car, and other considerations, the outlook for Continental is particularly interesting at this time. The current rate of operations for the company is very high, and from sources close to the company comes the prediction that earnings for the common stock in the first six months of the current fiscal year to April 30 will approximate \$500,000, or about 28 cents a share. The second half of Continental's fiscal year is almost always much more profitable than the first half, and there seems no reason not to believe that the same will be true in 1928.

The stock, selling at around \$11 a share, pays 80 cents annually, so the yield is better than 7 per cent. With its strong current position, the company is in good condition to take advantage of its opportunities.

ANOTHER competition for portable gas generators for motor vehicles is to be held in the Forest of Versailles, France, in June next. Competitors will be required to carbonize 5500 cu. ft. of wood, some of it freshly cut. During the trials there will be a service of buses with charcoal generator gas powerplants between Paris and the scene of the trials and an electric powerplant with charcoal gas engine will be operated.

Curtiss OX-5 propeller shaft end was best applicable with all factors evaluated. This was adopted as the No. 1 S.A.E. propeller hub shaft end. In the second group, it was found that the Curtiss C-6 and Wright Whirlwind engines used the same shaft ends and this was adopted as a proposed standard.

In the third group, composed of the Fairchild Caminez, Packard 1500, Curtiss H1640 and V-1550, and the Pratt & Whitney Wasp, the Packard 1500 engine shaft end was proposed as a standard. For the fourth group, composed of the Packard 2500, Wright Cyclone and Pratt & Whitney Hornet, the shaft end used on the Cyclone and Hornet was standardized, the discussion developing that these were now interchangeable. On all specifications it was decided, however, to omit thread specifications, as there seemed to be no logical reason for the variations back and forth from external to internal threads.

The present almost universally used fuel pump mounting was adopted as a proposed standard. Among the old S.A.E. specifications which were reconsidered and restandardized by bringing them up to date with current practice was aeronautic plain bolts and nuts and castle hexagon nuts. Standards for bevel washers and ball head bolts and nuts were dropped.

Standardizing of instrument mountings came under considerable fire. The subdivision of the Standards Committee engaged in this work had decided to recommend no action for standardization at this time in view of the possibility of introduction of smaller dial instruments in the near future. It was brought out, however, that the need for standardization was too

pronounced, and it was finally decided to adopt the present standards used by the Army and Navy for altimeters, airspeed indicators, thermometers and pressure gages as proposed S.A.E. standards, with the possibility of adding the smaller dial instruments as supplementary standards later.

Mounting dimensions for starters and generators were also adopted. Of the various subjects which had been considered by subcommittees but on which no action was proposed at this time were airplane tires, rims, wheels and axle ends and fuel and oil pipe dimensions. After considering the desirability of adopting standard engine mounting dimensions, it was decided, due to the present prevalence of building airplanes with demountable powerplant sections of the fuselage, that such action was not needed or desirable at this time.

Among the items on which standardization work will be carried on during the next six months are fuselage structural parts, instrument mountings, hardware parts, mounting of accessories and the accessories themselves, propeller hubs, tires, rims, and axles, batteries, wires, cables and lights, aileron horns and brackets and aileron and rudder hinges, magneto mountings, carburetor flanges and tachometer drives.

Present activities of the aeronautical division of the Standards Committee, on analysis, seem to concern themselves largely with providing a relative interchangeability of parts so as to decrease initial and service costs, as well as simplifying field replacement problems, especially in view of the constantly growing number of manufacturers in the aeronautical field.

Truck Design is Metropolitan S. A. E. Subject

REPRESENTATIVES of six manufacturers discussed truck design at the April meeting of the Metropolitan Section of the S.A.E. in New York City. Each of the speakers told of details of construction and the reasons which led to their adoption.

George P. Anderson, director sales engineering, Dodge Brothers, Inc., stated that the use of pneumatic tires on Graham Brothers trucks made it possible to achieve minimum weight of the vehicle and also made desirable the use of a powerplant of the passenger car type. He brought out the point that passenger car engines are capable of being sold at a favorable price because of the large volume of production. A decided tendency toward use of six cylinders in trucks is noted and the preference of drivers for this type of engine is a factor in this trend. The Graham Brothers six-cylinder, four-speed, 2-ton model with internal hydraulic brakes was illustrated by slides and described by Mr. Anderson.

The use of bolts instead of rivets in frames, a type of construction used by Autocar for several years, was discussed by B. B. Bachman of the Autocar Co. He also spoke of the use of bushings in brake linkage.

The Relay axle was described by W. J. Baumgartner, chief engineer, Relay Motors Corp. Relative acceleration and movement of axle and load were shown by diagrams for normal running conditions as well as when mounting an obstruction.

Chain drive for heavy-duty trucks and rubber shock insulation for chassis units were the topics discussed by A. S. Masury, vice-president and chief engineer of Mack. Action of rubber insulators was shown by motion pictures.

A. J. Scaife, chief field service engineer of the White Co., chose as his subjects the oil filter in the crankcase, two versus multiple bearing crankshafts and the single reduction rear axle for 2½ to 3½-ton trucks.

The Walter four-wheel drive truck was described by Maurice Walter, chief engineer of the Walter Motor Truck Co. He stressed the importance of weight distribution in large units and stated that ordinarily one-third is carried on the front wheels and two-thirds on the rear wheels. The need for a locking type differential on each axle and between front and rear axles on a vehicle of this type was mentioned by Mr. Walter and he described the irreversible worm type differential used in Walter trucks.

The program was arranged by J. F. Winchester, Standard Oil Co. of New Jersey, who presided at the meeting.

A BOOK on Automotive Springs has been issued by the Vanadium Corp. of America, New York. It deals with the problem of spring design in a general way, and particularly with the problem of spring materials. It is pointed out that the physical properties a steel must have in order to produce the best spring, and the relative values these properties should bear to one another, are known by engineers and metallurgists in only a very general way. One of the difficulties is that springs in service must withstand stresses that are variable, repeated and of a high order of magnitude, and they include bending, shock and torsional stresses in uncertain combinations. The book contains specifications of chrome-vanadium steel bars for springs.

Advertising Man Becomes Car Dealer to Study Retail Problems

Henry T. Ewald invests \$50,000 in Chevrolet agency in Detroit in order to "grasp from actual experience the various situations in which dealers become involved."

By Lewis C. Dibble

A SALES proving ground where actual automobile merchandising conditions can be studied from the dealer's own firing line has been introduced by Henry T. Ewald, president of the Campbell-Ewald Co., national advertising agency.

For some time past the industry has been witnessing many changes in the manner of merchandising automobiles. The manufacturer in particular has been devoting more and more attention to devising plans to help the dealer and as a result there has been growing a closer cooperation between manufacturer and dealer. Naturally much of this work has involved the activities of the advertising agency in laying out advertising campaigns and in other divers ways of assisting the client in formulating selling policies.

Ever since the early days of the industry Mr. Ewald has been associated with the automobile business. He has studied it closely from the angle of manufacture and production. He has gone into the problems of distribution and merchandising and naturally he has intensified upon automobile advertising.

Now he says he is determined to get a first-hand picture of the retail selling situation from the angle of the dealer. To accomplish this he has become a full-fledged automobile dealer and is going to take an impartial stand to find out, if possible, just what is right and wrong with the way automobiles are sold today.

To this end, \$50,000 has been invested in a Chevrolet agency in Detroit. A 500-car contract has been signed, and the establishment which operates under the name of the Mack-Gratiot Co. is located in a building which was designed especially for the purpose by the Argonaut Realty Co., a subsidiary of General Motors Corp. The entire place is equipped according to specifications laid down by the manufacturer and Mr. Ewald hopes that from the experiment will come sufficient knowledge to more than repay the investment and efforts. If the plan works as successfully as it is hoped it will, he may establish similar dealerships for other makes of cars advertised through his agency.

"We have never had a proving ground to test actual merchandising problems," said Mr. Ewald, "and I thought it would be a splendid idea to establish a dealership to operate as a proving ground so that the agency can grasp from actual experience the situations in which the automobile dealer becomes involved. It is our plan that the proving ground will give us the intimate touch with selling which ties right in with the agency's travel service."

In the case of the Campbell-Ewald Co., a force of 25 traveling representatives have been maintained who devote their time calling on dealers handling cars of companies whom the agency serves as advertising counsellors.

These travelers contact and assist the dealer in placing advertising, and at the same time make a study of merchandising conditions in their respective territories. They report regularly to the company headquarters and act as the pulse for Campbell-Ewald in contacting the field.

"We find that our travelers are keenly interested in the entire merchandising picture. They have been getting us a great deal of field information and it is certain that they have accomplished much good in their work," said Mr. Ewald. "For instance, we know what our various accounts are doing in the field. We also know about activities of the competition, and lastly we obtain a constant

and up-to-date picture of the used-car situation."

"Is it your intention," he was asked, "to try out different merchandising and advertising plans in operating the dealership?"

"Absolutely not," said Mr. Ewald. "We haven't any unique ideas to try. We are going to operate absolutely on plans as laid down by the factory. We are entering the situation with an open mind, and after all is said and done we hope to learn a great deal more about retail merchandising methods than we now know. This information naturally will be made available to our clients."

"As an example, we don't expect to have the most model salesmen in Detroit. Neither do we expect to have any angels in the service station nor do we intend



Henry T. Ewald

to dress them up in a lot of pretty white suits. We want to make this purely and simply a proving ground. We want conditions to exist as they do in the average good dealerships. It is our idea to conduct the place on plans as laid down by the manufacturer for us to pursue and at the same time mixing in a reasonable amount of commonsense business methods of our own.

"What we want to get is the attitude of mind of the dealer. If a dealer makes money he is satisfied. After all, the accounting sheet with its profit and loss statement is the final analysis of business and we want to find out just what are the factors for bringing about a satisfactory financial report." Mr. Ewald drew from his desk the standard accounting form as provided by the accounting division of General Motors Corp. For the six weeks that the dealership has been operating it showed that the project has been running at a satisfactory profit.

"To my mind that sheet is one of the most valuable services rendered to a dealer by the manufacturer. With it I find it possible for a dealer to efficiently control his business the same way that similar accounting layouts work for a large organization. With its use it doesn't take a dealer long to determine just where he stands and already I am convinced that if a dealer will follow its application closely to his business he should stand little trouble of going wrong.

"Here's another angle that has attracted my attention. For years we have been hearing much about the used car problem. Various plans have been suggested as a means of clarifying the situation. Many of us have thought that we had a good idea of how used cars should be merchandised. Already I have gone out on the used car lot and listened to salesmen trying to sell

a car. I am surprised at the number of people who are willing to gamble with a car 'as is.' A little later I am going into the used car lot myself and try to sell them. I want to know first-hand the elements that constitute a used car sale.

"The one thing, to date, that has struck me as most unusual is the completeness of the service rendered to the dealer by the automobile manufacturer. As an example, if I had wanted to open a drug store, hardware store or any other kind of business, it would have been necessary for me to go outside and engage some person thoroughly experienced in such procedure. But in entering the automobile business I found an entirely different situation existing.

"The manufacturer, through his sales organization made suggestions on just what equipment I would need for the storing of parts and also made a complete list of the parts stock I would need to carry. Then I was provided with the information which made it possible for us to install modern and efficient shop equipment. Next the company came forward with a wide variety of information telling us how to merchandise and service cars and also provided much valuable material on used car reconditioning and selling.

"We were given a complete break-down of the population in our district by nationalities and were also furnished with figures showing the potential car market that we served. Then the corporation came forward and installed the standard accounting service. As a result of all this I have sometimes wondered if the manufacturer isn't perhaps doing too much for the dealer. Surely, in no other business does the manufacturer go to such lengths to help work out the retailing problems of their outlets."

Elaborate Automotive Trials Begin in Germany

THE Allgemeine Deutsche Automobile Club, Germany's largest automobile organization, this spring is carrying through the great trial of automotive stock vehicles which it originally intended holding last year, but which was then opposed by the industry.

The trial has many novel features and is of a character never before attempted. It will include practically every kind of automotive vehicle from motorcycles to buses, and it will require 11 days to carry through, from April 30, when the vehicles are to be weighed-in, to May 10. The object of the competition is to test the practical value, economical running and general reliability of the vehicles and the endurance, ability and discipline of the drivers.

There will be three groups of motorcycles, sidecars and permanent three-wheelers, classified by the number of persons they are capable of transporting. Motorcycles of less than 250 cc. piston displacement will be regarded as solo machines; more powerful machines will have to carry a pillion rider or corresponding ballast, and the sidecar outfits, as also the three-wheelers, will have to carry three persons or ballast. The passenger cars will be classified solely by their seating capacity, irrespective of the sizes of their engines.

The only difference in the competition as regards the various classes will be the average speed that is to be maintained in the reliability run across Germany from Berlin to the Nuerburg Ring, which is one of the features of the trial.

The buses will also be classified in accordance with

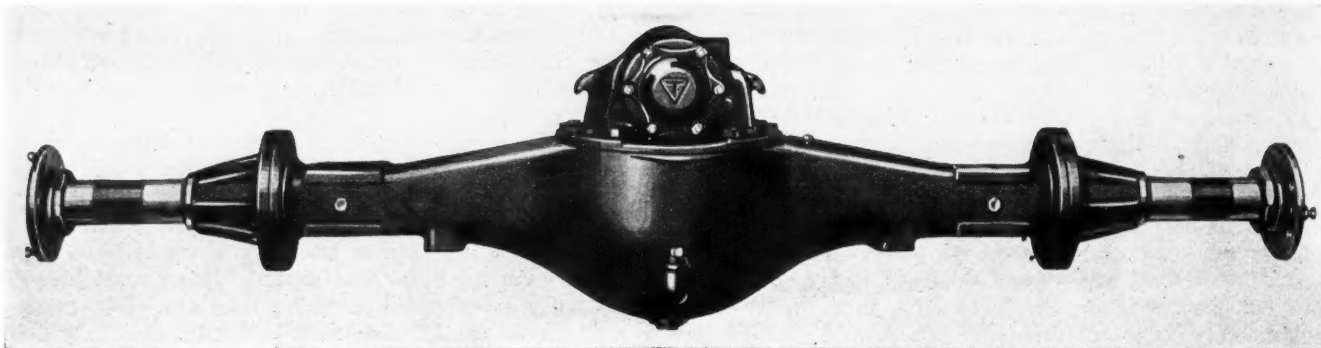
their seating capacity, four classes in all being provided, viz., bodies with 15, 22, 28 and more than 28 seats, and they will have to keep up an average speed of 15 to 21 m.p.h., this latter depending on the condition of the roads being traversed.

The other vehicles, ranging from delivery cars to heavy trucks, are classified according to the load they are able to carry. There are six classes for them and one additional for special vehicles.

The first active day of the trial will be May 1, on which acceleration properties will be tested, and also the rough-riding qualities, in a 50-mile cross-country run. May 2 will see the beginning of the long reliability run already referred to, which will end on May 6 on the Nuerburg track. In between there will, on May 3, be a hill climb of some 60 miles. On May 7 there will be an assembly competition. The next day will see a consumption test staged over a distance of about 420 miles, and May 9 will again be devoted to acceleration and rough-riding tests. On the last day there will be a number of smaller tests again including a sharp hill climb.

The awards will be made in accordance with a point-system.

A GERMAN inventor, H. Buschmann, has been granted a patent covering the use of electrolytically generated gases under pressure for injecting the fuel of Diesel engines. If this plan proves feasible it may have a far-reaching effect on the development of small Diesel engines.



New Timken worm-drive axle seen from rear

Worm Drive Axle for 2½-Ton Trucks Added to Timken Line

Made especially for use with dual rear wheels and is rated to carry 10,500 lb. on solid or pneumatic tires.

EFFECTIVE May 1, the Timken-Detroit Axle Co. will have in production a new addition to its series of worm drive axles. The latest model is designed for 2½-ton trucks with dual rear wheels and is rated to carry a maximum load of 10,500 lb. on either pneumatic or solid tires.

The new axle is of the full-floating type and is known as the Series 65,000. Its design can be changed in various ways to meet customer's specifications. Seven optional gear ratios are offered, and four optional braking systems.

Spring centers are spaced the standard 39 in. and the tread is 65 in. Both over and underslung driving arrangement can be used. The worm shaft itself is supported on two taper roller bearings, opposed at the rear, and a roller cylindrical pilot bearing at the front. The Timken block type differential driving

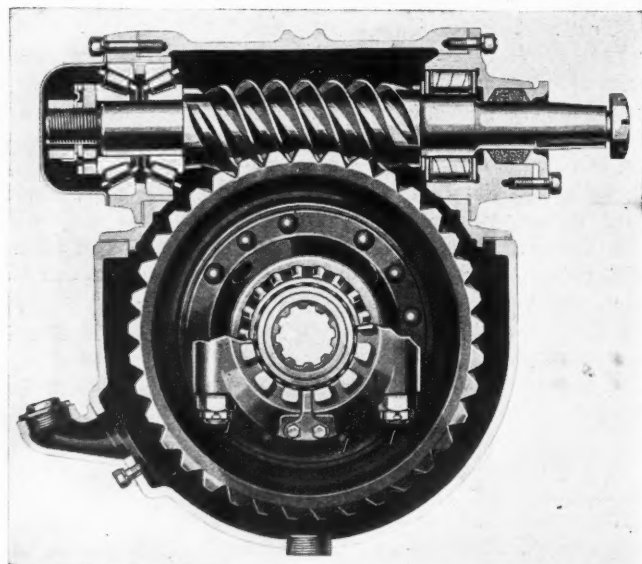
ring mounting is used for the differential. With the axle overslung, gear ratios available are 5½ to 1, 6:1, 6¾:1, 7¼:1, 7¾:1, 8¾:1, and 9¼:1.

A standard S.A.E. 1½ in. taper is used on the worm shaft end, with the small end of the taper located 10⅞ in. ahead of the axle center line. Inner ends of the axle shafts are 10 splined and 1 15/16 in. in diameter, while the straight portion of the shafts is 1 13/16 in. in diameter. Inner end supports are by the differential side gears. At the outer end the shafts have integral driving flanges, which bolt directly to the flange of the wheel hub.

A sleeve machined from heat-treated seamless steel tubing projects beyond the axle housing ends to form the support for the wheel bearings, the sleeve being a press-fit in the housing. Wheel hubs are mounted on this sleeve with Timken taper roller bearings, held in position and adjusted by threaded lock nuts on the sleeve.

In order to meet the demand for this size of axle, to take 20-in. tires, brake drums are 17¼ in. in diameter, which, it is stated, is the maximum size that can be used with these tires. These drums are 4 in. in width. The four types of brakes available are the "Timken Duplex," of the four shoe internal type, with two shoes on opposite quadrants acting as service, and the other two shoes as emergency brakes, on the same drum; Bendix brakes of the three-shoe internal type; Timken-Lockheed internal; or Timken-Westinghouse of the two-shoe internal type with two air-operated spiral cams. With the Timken-Duplex brakes the four shoes can be hooked up together to act as a single brake, and a worm shaft brake can be supplied if desired, the latter being of the internal type with a 13-in. diameter, 3½ in. width drum mounted on the universal joint companion flange assembled on the forward end of the worm shaft.

Without spring seats, brakes, brake drums, wheel bearings, and hubs, the axle weighs 444 lb. The spring seats are separate from the axle and are mounted on a square section thereof.



Section through center housing, showing worm mounting

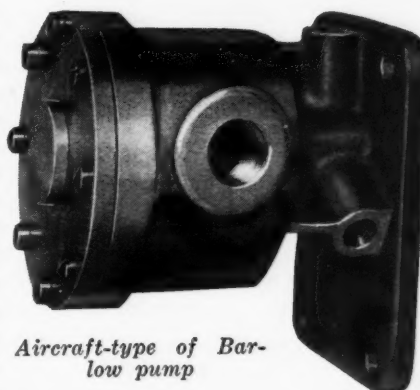
Fuel Pump *for Cars and Airplanes* Acts *on* Roller Principle

New development is offered by McCord Radiator & Mfg. Co.
Can be driven from generator shaft, camshaft or fan shaft.
Construction consists mainly of flanged casting.

A NEW fuel pump, developed by Lester P. Barlow, is being offered by the McCord Radiator & Mfg. Co. for automotive and aircraft use. The new pump is designed so that it can be driven from nearly any part of the engine, including generator shaft, camshaft, or fan shaft, and embodies a roller principle in design.

In construction it is composed mainly of a flanged casting, into which is inserted a smaller round casting carrying the intake, outlet and balancing ports. The pump shaft passes through the center of both castings and has a disk at the pump end in which are four grooves. In these grooves ride four steel rollers. The pump shaft and disk are eccentrically mounted in the pump casting, so that the rollers under centrifugal action ride away and toward the axis of rotation during a revolution, the clearance at the bottom between the pump disk and the hardened steel ring against which the rollers ride providing the space through which the fuel is pumped by the rollers.

The disassembled view here-with shows the port casting. The three outer ports on one side and the annular port on the same side serve as intake parts, and those on the other side for outlet. The reason for using the inner annular ports is to provide a balancing action for the rollers, as well as to aid

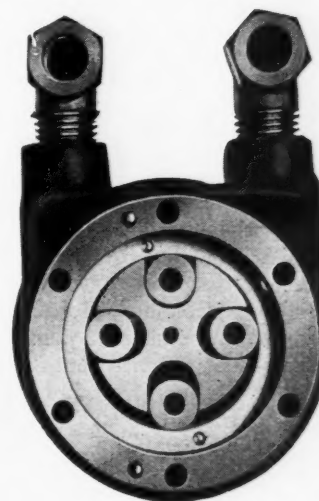


Aircraft-type of Barlow pump



Barlow automobile-type of fuel pump

View of automobile-type with cover removed and port casting shown separately



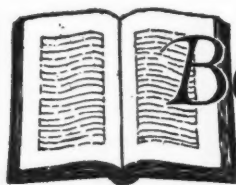
Parts of Barlow pump

the self-priming action of the pump, the latter being effected by reverse now. There is also a slight clearance between the rollers and the grooves in which they ride so as to complete the balancing action, and to provide some additional pumping action by radial flow of the liquid to the outer ports, as well as through the annular central outlet ports.

Two variations of this pump are being offered, one for automotive and one for aircraft engine uses, the latter incorporating a by-pass arrangement, and provid-

ing somewhat greater flow of liquid. While announced as a fuel pump it is also adaptable for other purposes, such as the providing of supply water for steam-cooling systems.

The pump is particularly efficient as regards suction, due to the self-priming action, and the centrifugal pressure of the rollers against the hardened and ground ring, aided by the weight of the rollers themselves. It will operate at very low speeds, and can be made to operate by merely turning the shaft with the fingers.



Books for the Business Bookshelf

Business Management Discussed

Industrial Engineering and Factory Management. Arthur G. Anderson, The Ronald Press Co., New York. 623 pp. \$5.

THIS book is intended primarily for students of business management and so covers, in less detail than is needed for practical application, every phase of business organization, management and control. Starting with the organization of an industrial enterprise, it discusses location and design of the factory, layouts, industrial relations, operation studies, wages, budgets, purchasing and stores control, inspection, production control and all the other necessary factors of modern industrial management. Although the great scope of the book precludes very detailed discussions of any part, considerable information is concisely presented which may suggest ideas to those familiar with the main purpose of the work.

New Aircraft Handbook

Aircraft Handbook. Fred H. Colvin and Henry F. Colvin. McGraw-Hill Book Co., New York. 464 pp. \$4. Third Edition.

A GREAT deal of progress has taken place in the aviation industry since the last edition of this book was published in 1921, so that in bringing it up to date the additions and changes have been many. The present volume contains complete information regarding the operation and maintenance of standard aircraft engines of today as well as considerable information on rigging and maintenance of fuselages. An added chapter discusses the many new instruments which have been developed during recent years. The air commerce regulations are given and there is a chapter on the construction of airports.

Behavior of Prices

The Behavior of Prices. Frederick C. Mills. National Bureau of Economic Research, New York. 598 pp. \$7.

IN the modern economic system prices and price relations play an immensely important part since they influence to very considerable extents the fundamental activities of production, distribution and consumption of goods. The present volume is the first report of an investigation which has been undertaken by the author, in behalf of the National Bureau of Economic Research, to determine just what these influences are.

This book presents the result of a preliminary study the objectives of which were to secure a better understanding of the behavior of individual commodity prices and to increase knowledge of the working of the price system and of the interrelations between its component parts.

The first chapter discusses the difference between commodities in respect to price behavior; the second treats with differences between markets in respect both to absolute prices and to their behavior; the third chapter is a study of price instability, while the final chapter discusses price measures in combination. The book is rather highly technical statistically, but contains a vast amount of very interesting and valuable information on price movements.

Handbook on Greases

Lubricating Greases. E. N. Klemgard. The Chemical Catalog Co., Inc., New York. 198 pp. \$5.50.

THIS is a fairly complete handbook on the manufacture and uses of lubricating greases of all kinds and should prove helpful not only to those engaged in the manufacture of greases but also to those who may be interested in their use. The general classes of greases covered in the book include cup greases, soda base greases, mixed soda lime base greases, sett greases, lead base greases, miscellaneous greases and compounded oils, and mechanical mixtures, while the last chapter of the book is devoted to the trends in grease research.

Writing Business Letters

Effective Business Letters. E. H. Gardner and R. R. Aurner. The Ronald Press Co., New York. 385 pp. \$3. Revised Edition.

THIS book, which has been rather favorably received since its first publication in 1915, has been brought up to date according to 1928 business letter writing standards. To those students of business writing who have been helped by the earlier editions, this revised edition should also prove useful since it gives a thorough discussion of the principles of good letters illustrated by numerous examples of successful letters which have been actually used by various business concerns.

Electrical Progress

Aladdin, U. S. A. Ernest Greenwood, Harper & Bros., New York. 265 pp. \$2.50.

FROM the title and introductory matter of this book it would appear to be a story of the truly marvelous developments in electrical engineering which have been accomplished in the last 40 years. After reading 50 pages, however, the reader finds himself in the midst of an argument against government interference in public utility matters, emphasizing the widespread ownership of public utilities, explaining the multifarious advantages of holding companies as employed in the industry and, in general, presenting the utility side of the many questions which are undergoing public scrutiny today.

New Eight-Cylinder Graham-Paige Has 120 Hp. Engine

Features include aluminum alloy pistons, Lanchester torsional vibration damper and four-speed transmission. Air cleaner is of new type. Entire fuel system mounted on chassis.

DETAILS of the new Graham-Paige eight-cylinder 120 hp. car, the last of the five models on the production program of the Graham Brothers for the 1928 season, have just been announced. The car has a wheelbase of 135 in. and is fitted with the Graham-Paige four-speed transmission with internal gears. It will be manufactured in four types which are priced as follows:

Sedan (5-passenger)	\$2,285
Town sedan (5-passenger)	2,385
Sedan (7-passenger)	2,410
Coupe (rumble seat)	2,485
Cabriolet (rumble seat)	2,485

These prices include front and rear bumpers and two extra demountable wood or disk wheels carried in fender wells. Six wire wheels are \$75 extra. Phaeton and town car bodies, custom-built by Le Baron, also are available in a variety of colors and upholstery.

The new eight-cylinder engine has a bore of $3\frac{3}{8}$ in. and a stroke of $4\frac{1}{2}$ in., making the piston displacement 322 cu. in. and the N.A.C.C. rating 36 hp., but the horsepower actually developed is said to be 120.

Five-Bearing Crankshaft

The crankshaft, which is statically and dynamically balanced, is supported in five bearings with a diameter of $2\frac{5}{8}$ in. and an aggregate length of $9\frac{5}{8}$ in. Other important items of the powerplant include aluminum alloy pistons with invar struts, a Lanchester torsional vibration damper, four-point, rubber-cushioned engine mounting, a spring-drive clutch with built-in vibration damper and a four-speed transmission. The use of this transmission in conjunction with a small rear axle reduction ratio tends to keep down engine speeds and thus to contribute to engine life and fuel economy.

The air entering the carburetor is filtered by means of a new type of air cleaner comprising metal threads covered by a film of oil. The fuel is also filtered, and fuel is fed to the carburetor by means of a diaphragm pump. All of the elements of the fuel system, including the main tank, feed pipes, filter and pump, are mounted on the chassis. This is said not only to facilitate assembly operations, making it possible to completely install the fuel system before the body is mounted on the chassis, but also to eliminate the transmission of certain noises from the chassis to the body.

Cooling water is circulated by a centrifugal pump driven by the timing chain, and a thermostatic valve is mounted in the water outlet from the cylinder head. The radiator is provided with a protective shield, the same as other Graham-Paige models.

Theft protection is provided for by a Hershey coincidental lock. Only one key is required for locking

the ignition, the steering gear, the doors and the two extra wheels. In the lighting system a buzzer replaces the conventional fuses. This keeps down the flow of current in case of a short circuit and permits the lamps to continue to burn until the "short" is repaired.

The equipment includes six demountable wheels of either the disk or natural wood type; Lockheed hydraulic internal brakes with automatic compensating master cylinder; four Watson stabilators; an instrument light and a separate light in the driver's compartment for the illumination of the steering lock; a combination tail, stop and back-up light; a V-V windshield, an automatic windshield wiper, a folding trunk rack, front and rear bumpers, cowl lights and a cowl band. The instrument board, in addition to the more commonly provided dials, carries a gasoline gage, a water temperature indicator, an electric clock and a cigar lighter.

The body equipment in the closed cars includes quarter reading lights, a robe-rail, a foot-rest, arm-rests, toggle grips, quarter and rear curtains, a vanity case, and a smoking set. The folding trunk rack when not in use as a luggage carrier is raised and forms a protective grid as an additional safeguard for the back of the car.

The five-passenger sedan is finished in blue with uppers and moldings in black, striped in ivory. A choice of broadcloth and mohair upholstery is offered. The seven-passenger sedan appears in light green with black uppers and moldings, and ivory striping, with the same option on upholstery. The town sedan is sage-green with uppers and moldings of highland green with ivory stripe; upholstery is broadcloth or mohair. The cabriolet is black, with moldings in light brown, and double hair-line striping of bright red. Upholstering may be either whipcord or leather.

The coupe, which seats two passengers in the front and two in the rumble seat, is finished in turquoise blue, with black moldings and ivory striping. Whipcord upholstery is used inside. The rumble seat is in leather.

ACCORDING to a table of air records officially confirmed up to Dec. 31, 1927, published by *L'Aéronautique*, Germany held 20 records; the United States 19; France 14; Italy 5; Switzerland 4; Czechoslovakia 3; Great Britain 2, and Hungary 1. The four seaplane records made in Switzerland should be credited to Germany as they were made with German equipment. That Great Britain holds only two records is due to the policy of the Air Ministry and not to any inferiority of British flying equipment. The speed record for seaplanes is nearly 7 per cent higher than the record for land planes. The altitude record for land planes is only 480 ft. higher than the record for seaplanes.

Bernard Bus With American Engine Wins Paris-Nice Run

Competing vehicles equipped with fabric leather bodies and six-cylinder powerplants. High speeds a feature.

By W. F. Bradley

FABRIC leather construction and six-cylinder engines were the two outstanding features of the motor coaches taking part in the first trials held for this class of vehicle over the road from Paris to Nice, a distance of 615 miles, and which was won by a Bernard, equipped with an American six-cylinder engine.

The Saurer Co., of Arbon, Switzerland, entered its new six-cylinder chassis which has been on exhibition in various European shows and is just about to be put into production. This chassis carried a 20-passenger Weymann fabric leather body. The Renault Co. of Paris completed with a special chassis fitted with a six-cylinder engine of 110 by 160 mm. Bore and stroke, and which up to the present has been used only on passenger cars. This chassis also carried a Weymann flexible fabric leather body. A second Saurer, with a four-cylinder engine, also had a Weymann body.

The Bernard had a rigid body with fabric leather covering, and carried 20 passengers. A Laffly 16-passenger coach with wood and metal body was not ready for the start, but joined the competition later.

Carrying 20 passengers and having a total weight of 10,839 lb. the Bernard coach was driven by a six-cylinder American engine of 222 cu. in. piston displacement and won the competition on the basis of low ratio of

weight to power. The 20-passenger Saurer was second with a piston displacement of 522 cu. in. and a total weight (including 20 passengers) of 13,333 lb.

Undoubtedly considerable weight was saved by reason of fabric leather construction. The 20-passenger Saurer coach had a chassis weight of 6433 lb., the Weymann body weighed 2866 lb., the weight of the passengers was 2640 lb., and extras such as shock absorbers, bumpers, spare wheel, headlights and fittings, were 1400 lb., giving a total of 13,333 lb.

Changes in Saurer Six

With a view to higher speed several mechanical changes had been made in the six-cylinder Saurer, the compression ratio being increased to 5.9 to 1, the governor removed to allow the engine, which has a seven ball-bearing crankshaft, to run at more than 3000 r.p.m., and the engine brake replaced by a Westinghouse servo type on the four wheels.

Some criticism was leveled against this competition on the ground that speed was unnecessarily encouraged, but there is a practical side to this, for the 20-passenger Renault coach is one which has been ordered by the Michelin Tire Co. for service between the factory at Clermont Ferrand and Paris, one of the conditions of the order being that, starting from Clermont Ferrand

At right—Saurer six-cylinder coach in French Alps at altitude of 4500 ft. during Paris to Nice run. Lower right—Bernard coach, winner of Paris to Nice coach trials. Lower left—Renault six-cylinder, 20-passenger fabric leather coach



at 5 p. m., it should reach Paris at 11 o'clock, thus averaging just over 39 m.p.h. for a run of 235 miles. During the speed trials, distance three kilometres, flying start, this Renault was officially timed at 71 m.p.h. The Saurer covered the same distance at an average of 66½ m.p.h.

The Weymann body construction on the 20-passenger Saurer follows the lines of private cars. The fabric covering is in two tints—blue up to the waist line and gray above this, with aluminum molding covering the joint. There are five doors on each side, these being brought down to the running boards and inclosing the

baggage compartments, which are mounted in the space on the running boards and under the floor boards. The passengers are seated four abreast, except at the front, where the driver and passenger by his side have separate armchairs, and above the rear axle, where there are two armchairs. Internal height is 53 in., and maximum width 82½ in. With a view to ventilation without drafts, the windscreen is hinged at the bottom, instead of at the top. Internal heating is provided by a muff around the exhaust box. Tire equipment is 34 by 7.5 in. pneumatics, single in front and dual on the rear, mounted on cast-steel wheels with detachable rims.

An Unconventional 4-Cylinder Motorcycle Engine

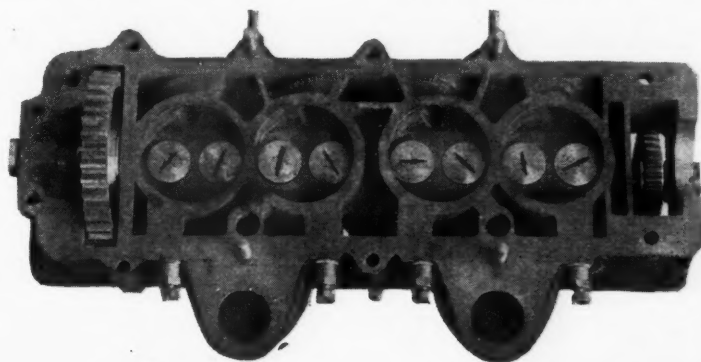
A FOUR-CYLINDER motorcycle engine with peculiar structural features has been designed by the German engineer, Windhoff, and is said to be ready for production. It has a bore of 2.48 and a stroke of 2.36 in. (piston displacement, 46 cu. in.). The most interesting feature is the oil-cooling system, which is similar to that of the English Bradshaw design, but is said to be an improvement upon it. There is no cylinder block in the usual sense of the word; the crankcase, which is of aluminum, is cast in halves, joined in the longitudinal vertical center plane by means of bolts. Cylinder liners of cast iron are set into this block and the cylinder head is bolted to it at the top. Large spaces are left between the cylinder liners and the finned walls of the aluminum block, and these spaces communicate with corresponding spaces in the cylinder head.

The crankshaft is supported in three large ball bearings mounted on the right half of the crankcase. The

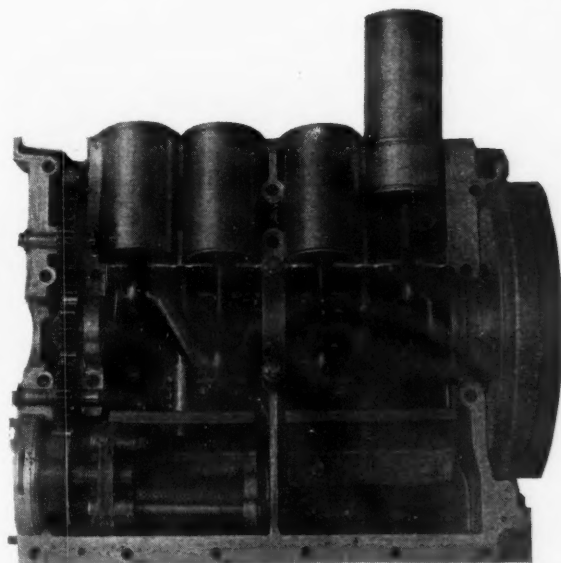
valves, which are of 1.1 in. diameter, are operated from an overhead camshaft, driven from the crankshaft through a spur-gear train at the front end of the engine, one of the gears being made of non-metallic material.

A large size gear pump is located in the crankcase at the forward end. It draws oil from the sump through a large screen and delivers it into the cylinder head, where it lubricates the camshaft bearings and valve stem guides and then drains back to the crankcase, a part of it being delivered to the bearings. It is claimed that in this way effective and uniform cooling of the cylinders is assured. As compared with a water-cooled engine, a material saving in weight is claimed, and as compared with direct air cooling applied to an engine of this general type, greater reliability. That the cooling system is quite effective may be judged from the fact that a 6 to 1 compression ratio is used, the engine developing 27.6 hp. at 4000 r.p.m.

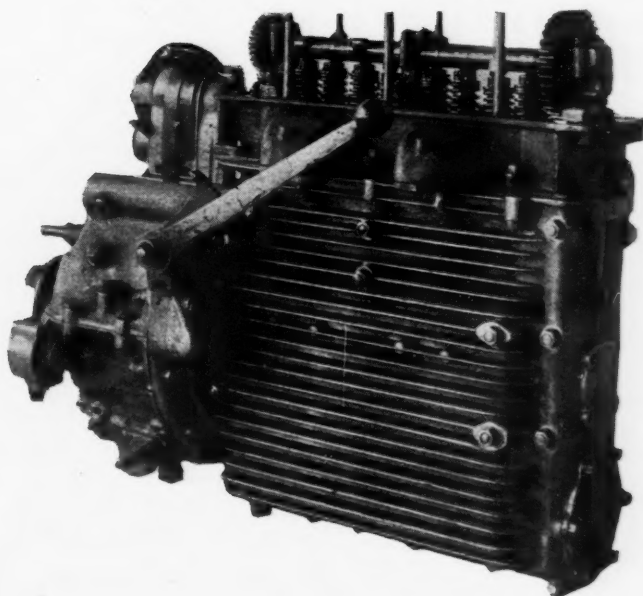
Right—Cylinder head of Windhoff engine



Below—Engine with half of crankcase and cylinder head removed



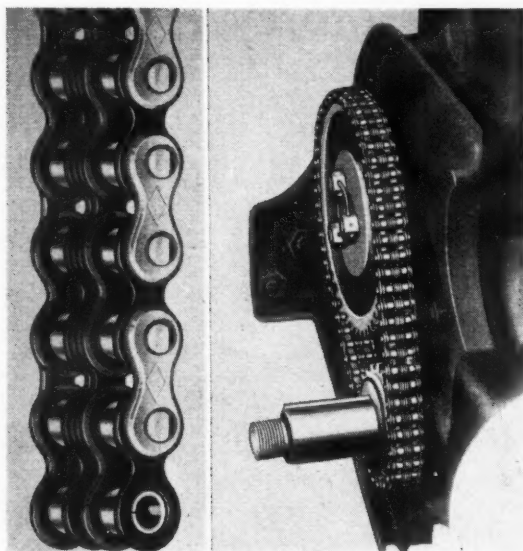
Below—Windhoff oil-cooled four-cylinder motorcycle engine



NEW DEVELOPMENTS—Automotive

Roller Chain Front End Drive

THE photographs reproduced herewith represent the roller chain front end drive used on the Marmon 68 and 78 cars. This drive was developed by Marmon engineers in collaboration with the Diamond Chain Co. of Indianapolis. It will be noticed that the



Front end drive of the Marmon 68 and 78 cars, and a section of the double roller chain used

drive is a simple one, from the crankshaft to the camshaft. The two shafts are relatively near together and there was little opportunity for the provision of a take-up or of means of adjustment. The advantage

claimed for the roller chain is that, owing to its comparatively small weight, the centrifugal forces on the links as the chain curves around the sprockets are greatly reduced.

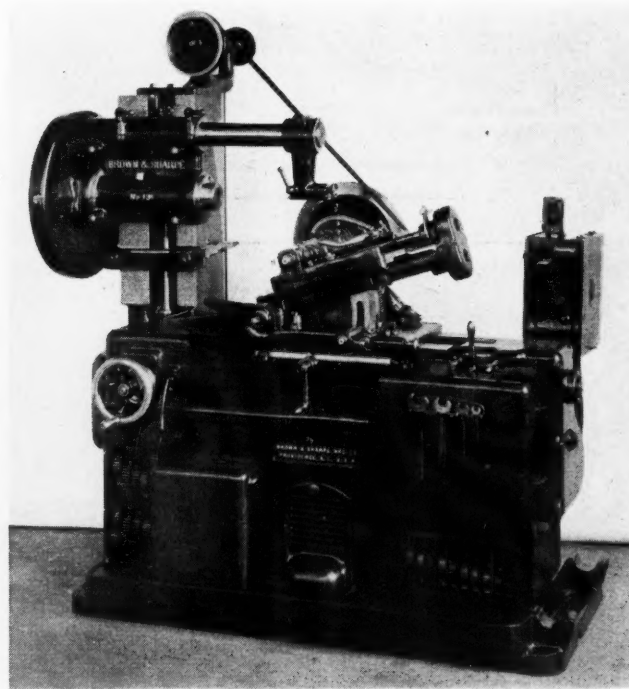
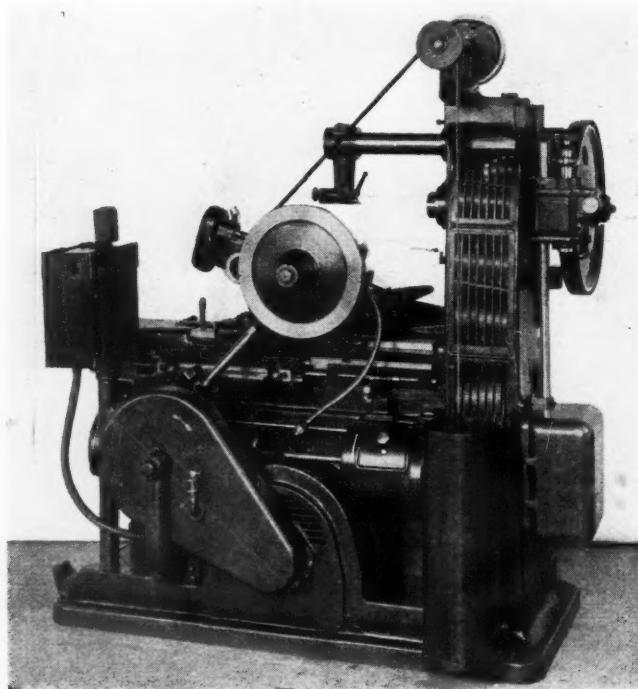
These centrifugal forces are also taken on the link pins and tend to increase the wear at these pins, which is the cause of so-called chain stretch that in time results in whipping of the chain and consequent rough operation. Whipping, moreover, is promoted by great lengths of chain between sprockets often found in triangular drives. In the Marmon there are only four-and-one-half links between sprockets, which practically eliminates all possibility of whipping.

As may be seen from the illustration, the chain is of the double roller type and passes over double sprockets on both the crankshaft and the camshaft. Its total length is only 24 in. (12 in. when doubled up). According to C. A. Hoffman, Marmon service manager, who recently completed a six weeks' trip calling on dealers, there is absolutely no binding action and complete absence of any noticeable amount of free play between links.

Gear Cutter Improved

THE Brown & Sharpe No. 13 automatic gear cutting machine which is designed for cutting spur and bevel gears, clutches, segments and other common jobs has undergone extensive changes to make it even more productive and easier to handle.

The capacity has been increased to 4 diametral pitch in cast iron and 5 diametral pitch in steel. The motor is located in the base and is completely inclosed with a current of cooling air being circulated about it through louvres at the front and rear of the compartment. Adjustment of the pre-stretched driving chain is made by



Two views of the Brown & Sharpe improved No. 13 automatic gear cutting machine

Parts, Accessories and Production Tools

movement of the plate upon which the motor is mounted.

The cutter slide is of rigid construction with the counterweight arrangement integral with the machine. The cutter slide has a maximum travel of $5\frac{1}{2}$ in. and a minimum of $\frac{1}{2}$ in. The oiling system has been simplified and the machine made heavier throughout so that it now weighs about 4000 lb.

Drilling and Tapping Machines

C. B. MAHAN, of Rochester, N. Y., who is connected with the F. A. Smith Mfg. Co., Inc., of that city, has developed a number of machines for combined drilling and tapping operations in both single-spindle and multiple-spindle operations. All of these machines were built by the F. A. Smith Co. for specific purposes, but they are now available for the general market. Mr. Mahan claims that these machines can be set up and operated by the ordinary run of factory help, that their production is high and that they are economical in operation.

Fig. 1 shows a combination two-spindle drilling and tapping machine of the floor type. The chucking arrangement is automatic and grips the piece before the drills or taps engage it. This machine has a wide range of adaptability and can be used for drilling, tapping, threading, counter-boring, counter-sinking, inserting screws, heading over rivets, and similar operations. As Mr. Mahan puts it, it will do any job that can be done on a vertical drill press of equal capacity, besides many others.

Fig. 2 shows a two-spindle drilling and tapping machine of the bench type. This, in a way, is a miniature of the machine shown in Fig. 1, but runs at higher speed. The original machine is in practical production tapping 3400 holes per hour with a 4-36 tap in a blind hole to the bottom. It is said to be impossible to strip the threads in the hole, and tap breakage is said to be very low. By shifting the drive belts to the fixed pulley this machine is converted into a drilling machine capable of drilling 4400 holes per hour. By equipping the chuck with a die holder, the ends of a small crank have been threaded at the rate of 1500 pieces, or 3000 ends per hour. By equipping one side with a drill and the other with a tap, drilling the hole with one spindle and tapping it with the other, a production of 1200 drilled and tapped holes is obtained.

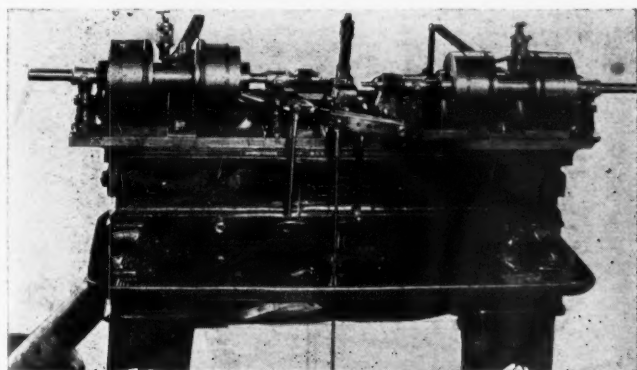


Fig. 1—Mahan combination two-spindle drilling and tapping machine, floor type.

On drilling and counterboring operations during the same set-up the production is 2200 holes per hour.

A single-spindle drilling and tapping machine of the bench type is also made and is essentially one-half of the regular machines. It will be noted that all of these machines are of the horizontal type, for which it is claimed that it simplifies jig construction, eliminates trouble from dirt and chips, eliminates the effect of the weight and backlash of the spindle on the feed and makes it possible to set the machine to tap to a definite depth, the tap reversing automatically when it reaches the bottom of the hole. Differences in lead and in cut-

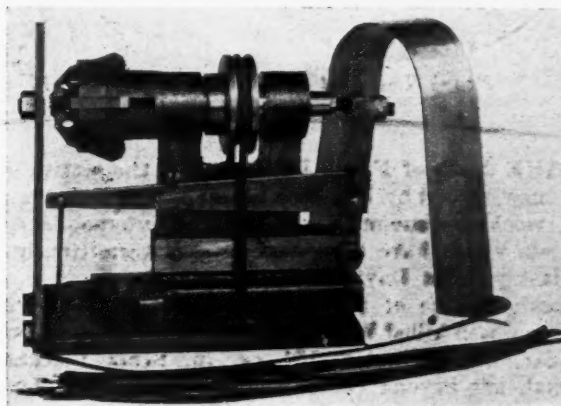


Fig. 3—Mahan centrifugal wire stripper

ting speed are controlled by means of a spring. The production capacities of these machines are said to be limited by the capacity of the operator, taps having been run in them at a speed of 2000 r.p.m.

Fig. 3 shows a machine for removing the insulation from insulated wire of all gages. This also is a high-speed machine, giving a production of 2500 ends per hour in some instances. In addition to removing the insulation, it twists the wires. The machine is designed to operate on the centrifugal principle. Its jaws are opened by pressing on a pedal and the jaws close centrifugally to the gage of the particular size of wire being worked upon. Variations in the size of the wire are taken care of automatically. The jaws are fitted with three small cutting disks of steel, and by turning them slightly on their stud, a new cutting surface is brought into action.

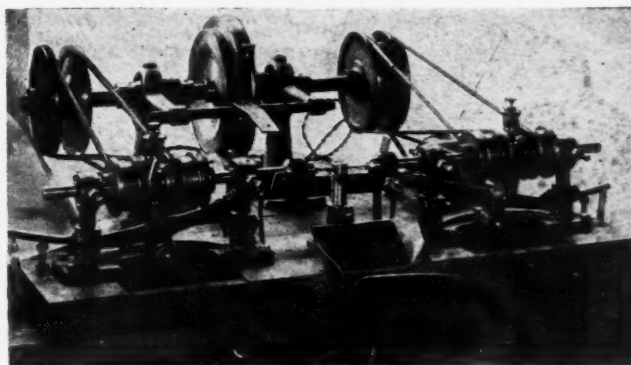


Fig. 2—Bench-type of double-spindle drilling and tapping machine



Frank Lockhart

Lockhart Killed in Speed Trial at Daytona— Record Set by Keech

*Ace of American racing drivers meets death when car gets beyond control while traveling 200 m.p.h.
Was trying to better competitor's time.*

THE death of Frank Lockhart and the setting of a new record by Ray Keech brought to a climax this week the one-mile international automobile speed contests which have been under way intermittently for the last year at Daytona Beach, Fla.

Lockhart, one of the best known racing drivers in America, was killed Wednesday morning, April 25, when his car, a 16-cylinder, 181 cu. in. Stutz Blackhawk Special, got beyond control and turned over during a trial run at a speed in excess of 200 m.p.h.

Lockhart was 25 years old and was a product of the Pacific Coast. He had been driving in competition about five years, getting his first experience on the dirt tracks of the West. Fame came to him suddenly and unexpectedly. He came East to Indianapolis from the Coast in 1926 to see the annual 500-mile Speedway classic. He was unknown but introduced himself at the track and soon made friends among the drivers and mechanics. Then Pete Kreis took sick just before the race, was told he would be unable to drive, and decided he would give his wheel to Lockhart.

Wins First Big Race

The car was a 91½ cu. in. Miller Special and Lockhart piloted it through the race with such skill and daring that he won. This feat established him as one of the premier drivers of the world and from that time until

his death he remained very much in the public eye.

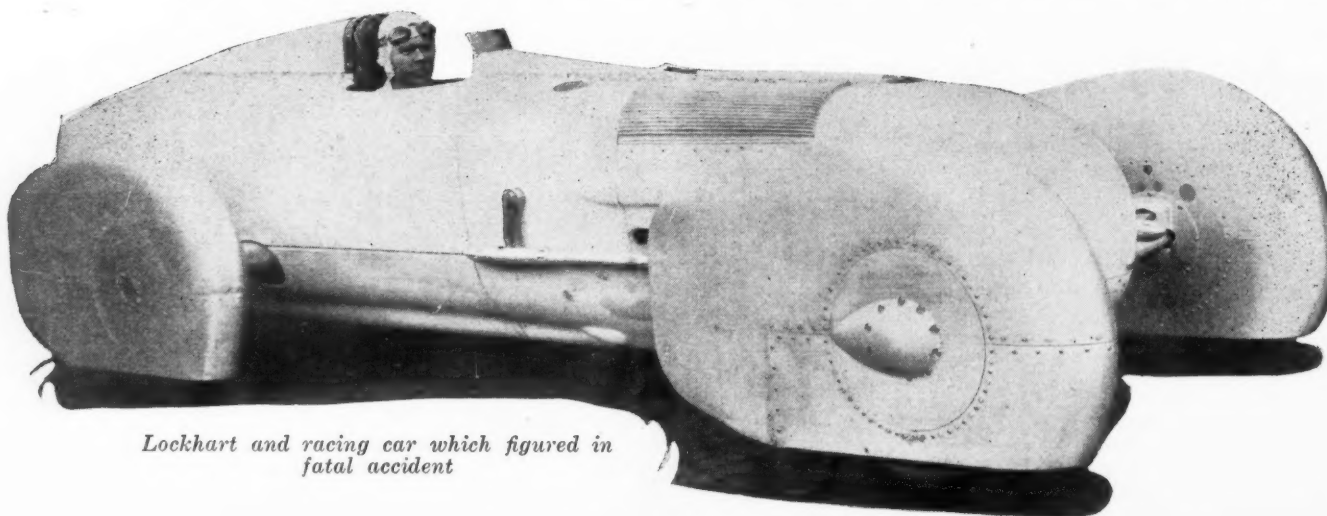
In 1926 and 1927 Lockhart finished second in the A.A.A. national racing driver championship. During 1927 he set a world's record of 164.28 m.p.h. for a 91½ cu. in. car on the dry lakes of California. Two months afterward, on May 7, 1927, at the Atlantic City board speedway, he qualified his car on the mile and a half track at 147.72 m.p.h., the fastest circular track lap ever made with any car, regardless of size.

Unusual Engineering Ability

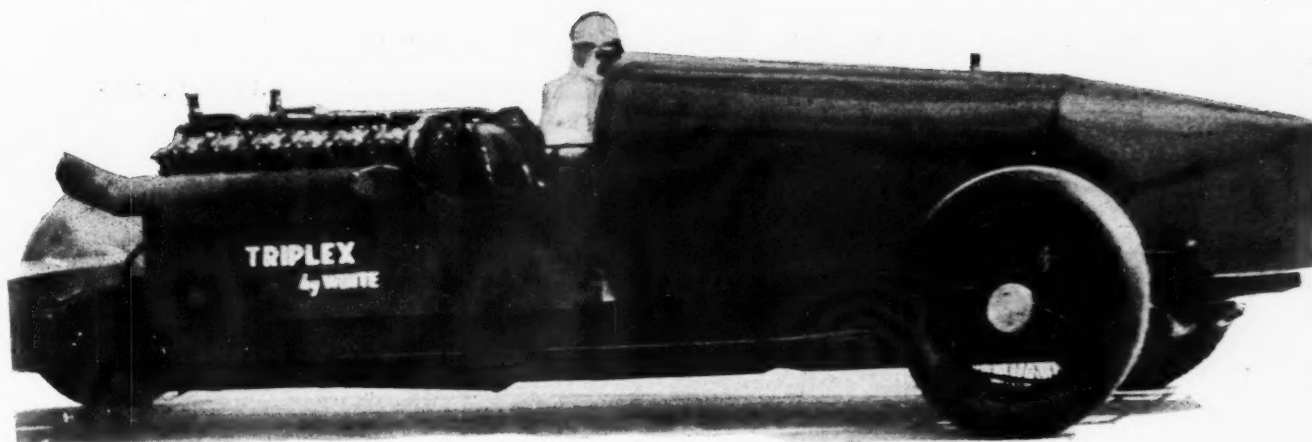
Lockhart was a driver of unusual engineering ability. Much of his success on the tracks was said to be due to the fact that he could take a standard racing car and work out small changes in design here and there which resulted in 5 to 10 m.p.h. more speed than his competitors could get from the same type of car.

The specially-built car in which he met death was largely his own creation and it was regarded as a masterpiece of engineering.

It will be recalled that an accident similar to the one which caused his death overtook Lockhart at Daytona Beach on another occasion several months ago. The date was Feb. 22, and the driver, using the same car in which he was killed, was trying to lower the record of 206.95 m.p.h. then held by Capt. Malcolm Campbell, the Englishman. Lockhart hit an irregularity in the



Lockhart and racing car which figured in fatal accident



Triplex racer in which Keech drove 207.55 m.p.h.

sand while traveling at terrific speed and catapulted into the ocean. He escaped then, however, with minor injuries.

Lockhart was perhaps the most popular driver of his day. His youth, his skill and his daring made a strong appeal to the public and whenever he appeared in competition he was the center of interest and the favorite of the fans. The other drivers admired and respected him, and also feared him, for he drove a furious race and invariably set the pace in any event that he entered. Only mechanical trouble could slow him down.

Among those who knew him personally there is universal grief over his death. He lived as he raced—"clean"—had an extremely likeable personality, conducted himself always as a gentleman and took his honors modestly. His going is a distinct loss to American automobile racing.

When Lockhart died he was attempting to lower the new world's record for one mile which Keech had established on the same course only last Sunday, April 22. Driving J. M. White's 36-cylinder "Triplex," Keech traveled the one-mile record course in each direction for an average speed of 207.55 m.p.h., thus bettering by slightly less than 0.6 m.p.h. the time established at Daytona last February by Captain Campbell with his Campbell-Napier "Bluebird" racer.

The car which Keech drove has been described previously in *Automotive Industries* (Nov. 19, 1927). It has a piston displacement of 4950 cu. in., a wheelbase of 175½ in., and weighs 8000 lb. Power is furnished by three 12-cylinder Liberty aircraft engines, two of which are mounted side-by-side behind the driver, and one in front.

Unique Reversing System

When J. M. White, who is a Philadelphia manufacturer of insulated automotive cable, took his car to Daytona Beach for the trials last February, he was not permitted to compete under official A.A.A. sanction because the machine was not equipped with a reversing system. To meet this situation he devised a rather unique system comprising an extra set of rear wheels. These are not shown in the above photograph.

The forward set of rear wheels are in contact with the ground only when the car is backing. They are controlled by a worm and wheel jacking mechanism

which depresses their mountings and raises the car off the rear, or driving wheels. A small electric motor with battery current source transmits motive power to the forward set of rear wheels through a small gearset of high reduction and thus propels the car in the reverse or backing direction. Since there is no clutch the auxiliary wheels also enable the engine to be run with car standing.

Keech, as a result of his performance, rises from comparative obscurity as a racing driver to a place among the leaders in this realm of sport. He is 30 years old and was born near Coatesville, Pa. For a number of years he has resided in Atlantic City and for seven or eight years has been a familiar figure around the dirt-track circuits of the East. Although he had chalked up several creditable dirt-track victories and was known as a skillful and fearless driver, he never gained national notice until his performance at Daytona.



Ray Keech

AN improvement in methods of purification of cracked petroleum has been developed by R. A. Holloran of the Standard Oil Co. Until now the products of the cracking still have been purified with concentrated sulphuric acid at normal temperature. This resulted on the one hand in the removal of sulphur compounds, which were the cause of unpleasant odors of the fuel, and, if they remained in the fuel, led to the production of sulphuric acid in the crankcase and consequent crankcase corrosion; on the other hand, the so-called unsaturated hydrocarbons were either dissolved or they were polymerized to heavy hydrocarbons, the presence of which decreased the volatility of the fuel and thus lowered its value.

By Halloran's method, the product of the cracking still is first treated with spent refinery acid in order to remove its water content; it is then cooled to—6 deg. Fahr. and subjected to the action of concentrated sulphuric acid. Care is taken that the heat of mixture does not cause a temperature rise of more than 8-10 deg. Fahr. The final result is that only the injurious components, that is, those having corrosive influences, are removed, whereas the unsaturated compounds remain in the fuel in their original form.

Polymerization of the unsaturated compounds by the former treatment at normal temperatures under certain conditions resulted in losses up to 30 per cent.

AUTOMOTIVE **NEWS SECTION** INDUSTRIES

Philadelphia, Pennsylvania

April 28, 1928

Factory Operations in May to Continue at High Level

PHILADELPHIA, April 28—Though capacity operation has been the rule in nearly every automotive plant during April, the end of the month will find many factories carrying over orders into May, which, added to the already large May schedules, will make certain that production will continue at high levels. There is every indication now that the second quarter this year will rank with the industry's best production periods.

With business accumulating without the aid of unusual stimulants throughout the second quarter, the industry sees an opportunity for an unusually good third quarter with the removal of the present excise tax. The able presentation to Congress of the industry's case, backed with the assurance of immediate benefit to car purchasers, is seen as giving promise of favorable action.

Retail conditions have shown constant improvement through April, particularly in the Southeastern section of the country, where lower priced cars have had a much improved market. Medium and higher priced lines have been selling in better than normal quantities in nearly all sections. Used car demand is responding throughout the country to better selling methods and more attractive prices. Dealers' stocks of both new and used cars are within conservative bounds.

Sloan Says New Models Make Advertising Vital

NEW YORK, April 27—Pointing out that the automobile meets a very fundamental demand for a reasonably priced, flexible, convenient means of transportation and communication, Alfred P. Sloan, Jr., president of General Motors Corp., told the bureau of advertising of the American Newspaper Publishers Association at a dinner in the Waldorf-Astoria last night, that automobiles would probably continue to be the largest individual unit advertising through newspapers.

The problem of the industry is to continue to develop new offerings from year to year and as these new offerings are developed it will continue to be necessary to keep the public regularly informed through the press.

Krohn and Glasson Named to Dodge Brothers Posts

DETROIT, April 26—Henry Krohn has been appointed director of Senior Six sales by Dodge Brothers, Inc. He resigned recently as sales manager of the Graham-Paige Corp. after a Paige affiliation of 18 years. Rex Glasson has been appointed sales promotion manager, resigning as vice-president of Cram's Automotive Services.

Car Tax Elimination Nears Final Stage

WASHINGTON, April 26—Action of the Senate finance committee in removing the automobile excise tax was declared by Roy D. Chapin, president of the National Automobile Chamber of Commerce, as being a "square deal" for the motorists of the country. "The repeal must not be regarded as a victory for the manufacturer, who does not have to pay the tax, but a victory for the motor car buyer who was saddled with an unjust burden for the last nine years," Mr. Chapin declared.

The tax reduction program as provided in the committee's report carries a total of \$210,120,000. The administration's program called for a reduction of \$201,000,000. The measure as it passed the House called for a total of \$290,000,000. The House ways and means committee voted to reduce the tax from 3 to 1½ per cent. By vote of 180 to 120, however, the House voted complete repeal of the automotive tax.

The Senate committee has not as yet decided the administrative features of the bill insofar as they relate to a refund of the automotive tax which have been paid by the 50,000 dealers of the country on cars in stock.

Gotfredson Offers Line With Lockheed Brakes

DETROIT, April 25—Three new four-cylinder trucks have been added by the Gotfredson Truck Corp., consisting of 1½, 2 and 2½ ton models equipped with Lockheed hydraulic four-wheel brakes. A utility dump truck also has been added. Buda engines are used throughout the line as are Ross cam and lever steering gears. Axles in the several models are supplied by Clark, Timken and Shuler. Transmissions are Brown-Lipe and propeller shafts are Spicer. A rated speed of 35 m.p.h. is specified.

Enlarge Plane Factory

KANSAS CITY, April 24—The factory of the American Eagle Aircraft Corp. here, is to be enlarged with a 20 x 100 ft. addition to be used as a wing factory.

Hoover Says Trade Steadily Improving

WASHINGTON, April 25—Business conditions in the United States at the present time are showing a steady improvement, according to Secretary of Commerce Hoover, in a statement issued this week.

"Industries in general are coming out of a seasonal dip, and, generally speaking, the business situation looks much brighter," Secretary Hoover declared. He pointed out that there is considerably less unemployment than 30 days ago, and expresses the opinion that highway construction and the government's \$60,000,000 building program for the nation's capital would help out the employment situation, especially in the East.

Safety Congress Urges Stronger Automobile Laws

KANSAS CITY, April 23—The second annual Central States Safety Congress opened here today with almost 2000 safety leaders in attendance. Among the leaders here are Homer E. Niesz, Chicago, president of the National Safety Council; W. H. Cameron, managing director of the national council, and Sidney J. Williams, national director of the public safety division.

Mr. Niesz declared the Middle West was rolling up a greater loss of life from automobile accidents than the East and urged a strenuous safety campaign. He deplored the lack of adequate motor vehicle laws and the lax enforcement of present laws.

D. O. McCray, Topeka, Kan., declared there must be a curbing of the use of liquor or there would be such stringent laws enacted that the whole motor car industry would be injured. He drew a picture of conditions should there come a time when motor car drivers could obtain "whisky as freely as they now can obtain gasoline."

Judge Levi Hall of the Minneapolis traffic court says the best cure for traffic violations is few regulations, rigidly enforced.

N. J. Sales Gain in March

NEW YORK, April 25—New car sales for the State of New Jersey during the month of March amounted to 11,095 as compared with 10,556 for March, 1927, according to Sherlock & Arnold. Total sales of new cars for 1928 to March 31 were 23,394 as compared with 23,880 in 1927.

Studebaker Profit Rises to \$3,979,873

Increase in Business in First
Quarter Yields Increased
Earnings of \$576,936

SOUTH BEND, April 25—Studebaker Corp. of America for the first quarter of 1928 reports net sales of \$38,654,315 with net income after all charges of \$3,979,873. This compares with net sales of \$34,304,643 and net income of \$3,402,937 in the first quarter of 1927. A total of 34,690 cars were sold during the first quarter against 29,155 in the first quarter last year. Profit and loss surplus as of March 31, 1928, was \$40,080,505, against \$37,461,769 on the same date in 1927.

Net income was equal to \$2.05 a share on common stock against \$1.74 a share in the first quarter last year. Current assets were \$54,639,717, including \$12,263,280 cash and \$30,346,473 inventories, and current liabilities were \$16,172,802 as of March 31, 1928.

Motor Wheel Profit \$561,644

LANSING, April 26—Motor Wheel Corp. reports net profit of \$561,644 in the first quarter this year as against \$505,403 in the first quarter last year. Surplus after dividends was \$286,644 as against \$210,825 last year.

Yellow Truck Loss \$537,608

DETROIT, April 25—Yellow Truck & Coach Co. for the quarter ended March 31 reports net sales of \$9,467,915. Before provision for depreciation there was net loss of \$345,991 and after allowing for depreciation net loss was \$537,608.

Wright Earnings \$470,897

PATERSON, N. J., April 25—Wright Aeronautical Corp. in the first quarter this year increased gross sales to \$1,468,379 from \$537,024 in the same period last year. Net profit after taxes was \$470,897 as against \$133,669 in the 1927 quarter.

Curtiss Net Profit \$190,122

NEW YORK, April 25—Curtiss Aeroplane & Motor Co., Inc., reports sales of \$1,496,923 in the first quarter this year as against \$657,971 in the first quarter in 1927. Net profit of \$190,122 as against \$99,058. Surplus was shown of \$1,322,546 comparing with \$534,369 a year ago.

USL Battery Earns \$456,167

BUFFALO, April 25—USL Battery Corp. for the first quarter reports net profit of \$456,167 after charges but before Federal taxes, comparing with \$244,019 in the first quarter last year.

Spicer Earns \$420,268

NEW YORK, April 25—Spicer Mfg. Co. reports net profit for the first quar-

ter of the current year before Federal taxes of \$420,268. This is equivalent after preferred dividends to \$1.24 a share on the common stock and compares with \$241,307, or 81 cents a share, for the corresponding quarter of 1927.

Stewart-Warner Net \$1,387,284

CHICAGO, April 25—Stewart-Warner Speedometer Corp. reports net income of \$1,387,284 in the first quarter, equivalent to \$2.31 a share. This compares with \$1,062,048 or \$1.77 a share in the first quarter last year.

Car Tariff Repeal Asked in Hull Bill

WASHINGTON, April 25—Repeal of the duties on automobiles, automobile bodies and chassis, motorcycles and accessories, including tires, is proposed in a bill introduced in the House today by Representative Hull of Tennessee. The present tariff is 25 per cent on automobiles and motorcycles and 10 per cent on tires.

In asking the removal of these tariffs, Mr. Hull said he was actuated by an announcement of the National Automobile Chamber of Commerce that "the greatest obstacle confronting American exporters of automobiles is the tariff wall being built up abroad in retaliation, because of the high duties on foreign automobiles imported into the United States."

Mr. Hull pointed out that in 1927 this country imported 635 automobiles and chassis valued at \$1,219,000, and bodies and parts valued at \$1,146,000. In the same year, he said, the United States exported 297,000 passenger cars, valued at \$207,962,000.

"It must be clear to all persons now," said Mr. Hull, "that the normal progress of this great industry, even in the immediate future, depends upon the speedy development of wider foreign markets."

"The United States, instead of constantly increasing tariffs under the flexible provision, as has been the case in recent years, must take the lead in the opposite direction."

Renault Opposes Tariff, "Not Good for Business"

NEW YORK, April 24—Louis Renault, French automobile manufacturer, arrived in the United States today accompanied by his wife and son, and by MM. Serre and Tordet, two engineers of the Renault company. He will make an inspection of the American automobile industry.

M. Renault said he was opposed to high protective tariffs on automobiles here or abroad. The industry is no longer an infant one, he said, and the tariff should be lifted in all countries letting trade go, as it should, to the best product. The American high tariff calls for a retaliatory one on the part of other countries, he said, and that is not good for business.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co.

NEW YORK, April 26—The advance of the Federal Reserve rediscount rates at Chicago, Boston, St. Louis and Richmond from 4 to 4½ per cent has been followed by a mild reaction on the stock market. Prices have declined moderately and the volume of trading has decreased.

The rate advance was preceded by a withdrawal of \$48,000,000 of reserve credit from the money market through the sale of government securities and a reduction in holdings of acceptances purchased in the open market during the week ended April 18. Although total loans of reporting member banks of the Federal Reserve system increased only \$4,000,000 during this period, there was a gain of \$135,000,000 in loans to brokers in New York City, bringing the total of this item up to a new peak of \$4,129,000,000. Money rates in the open market continued to advance last week.

FISHER'S INDEX

Commodity prices remain very firm. Professor Fisher's index advanced last week to the highest level reached so far this year at 99.4, which compares with 98.9 in the preceding week and 98.2 four weeks earlier. The monthly wholesale index of the bureau of labor statistics declined from 96.4 to 96 during March.

GENERAL BUSINESS

Business in general is in fair volume, although bad weather has reappeared as an adverse factor. This has interfered with retail trade, especially in the agricultural districts, and has also hampered the planting of crops. The farming season for the country as a whole is reported to be unusually late.

FREIGHT CAR LOADINGS

Car loadings reflect little change in trade volumes, weekly totals being well below those of last year. Loadings during the week ended April 7 numbered 919,296 cars, or 29,131 cars less than in the previous week and 34,611 cars less than a year ago.

BANK DEBITS

On the other hand, commercial check payments, measured by bank debits to individual accounts outside of New York City, during the week ended April 18 were 3 per cent larger than a year ago, and the total for the year to date is 6 per cent larger than the corresponding figure for 1927.

PETROLEUM OUTPUT

Crude petroleum production declined further during the week ended April 14, the average daily output being 2,382,600 bbl., as against 2,395,250 bbl. in the corresponding week and 2,452,500 bbl. a year earlier. Numerous advances in gasoline prices occurred last week, while quotations for crude oil remained virtually unchanged.

March Production Rises to 422,549

U. S. Passenger Cars Show
Important Increase But
Canada Shows Drop

PHILADELPHIA, April 24—Production of cars and trucks in the United States and Canada in March totaled 422,549 as against 335,872 in February and 417,667 in March last year, according to figures issued by the Department of Commerce. For the quarter production totaled 998,531, as against 995,387 in the first quarter last year.

Passenger cars built in March in the United States totaled 371,408, which compares with 290,831 in February and with 345,911 in March last year. Truck production in the United States in March totaled 41,417, an increase over the February total of 32,683, but below the March figure last year of 48,532. Canadian passenger car output showed a sharp decrease in March to 7478, which compares with 10,315 in February and with 19,723 in March last year. Canadian truck output in March was 2246, an increase over the 2189 February total but a decline from 3527 in March last year.

Follen-Lorenz Buys Plant and Expands Operations

KENOSHA, April 21—The plant of the former Marwin Motor Truck Co. at Kenosha, Wis., has been acquired by the Follen-Lorenz Tool Co. of the same city, which will occupy the area, consisting of 35,000 sq. ft., after remodeling and retooling. The Follen-Lorenz company will continue its tool and die making work on an enlarged scale and also will add a complete metal stamping and deep drawing department, having accepted contracts with several large automotive concerns for parts.

The name is being changed to Follen-Strom Mfg. Co. with the entrance of Carl Arthur Strom, engineering graduate of the University of Wisconsin, as vice-president and general sales manager. Fred Lorenz, one of the founders of the company, has been inactive in the management for some time past, although retaining an interest. James H. Follen is president-treasurer and general manager.

Willys Builds 1810 in Day

TOLEDO, April 23—Willys-Overland Co. set a new day production record on April 19 when 1810 cars were built. Indications are that April sales and production will set new high records. The company reports 26,000 unfilled orders on hand.

Two Ajax Directors Named

NEW YORK, April 21—Frank Leahey and J. L. McNair have been elected directors of the Ajax Rubber Co., succeeding J. C. Weston and J. C. Maxwell, deceased.

First Quarter Shows 3144 Gain Over 1927

1928			
	Cars	Trucks	Total
Jan. ...	212,248	27,862	240,110
Feb. ...	301,145	34,727	335,872
Mar. ...	378,886	43,663	422,549
Total ..	892,279	106,252	998,531
1927			
Jan. ...	211,395	42,907	254,302
Feb. ...	278,997	44,421	323,418
Mar. ...	365,634	52,033	417,667
Total ..	856,026	139,361	995,387
Apr. ...	377,899	51,449	429,348
May ...	379,139	50,666	429,805
June ...	295,198	45,956	341,154
July ...	245,585	33,871	279,456
Aug. ...	284,489	36,819	321,308
Sept. ...	235,121	36,519	271,640
Oct. ...	189,177	38,224	227,401
Nov. ...	114,076	25,743	139,819
Dec. ...	108,356	28,626	136,982
Total ..	3,085,086	487,234	3,572,300

Reo Raises Output Above 6000 Monthly

LANSING, April 21—Even with unfavorable weather conditions existing in many parts of the country Reo Motor Car Co. is swamped with business, according to C. A. Triphagen, general sales manager.

"We started the month of April with the hope that we would reach the record-breaking total of 6000 units—cars and Speed Wagons. Our production didn't run at that rate for the first half of the month; but it is now 'up there' and climbing steadily," said Mr. Triphagen. "We are virtually assured, now, of hitting the original objective—which means that for the last half of the month we will be shipping at a monthly rate of considerably more than 6000.

"Consequently, if the demand for May continues, as now seems certain, we will be in a position to turn out between 6500 and 7000 units for that month. The carry-over of unfilled April orders into May will be very heavy, to say nothing of the new orders for May shipment, which in accordance with our usual custom we do not begin to book until the 20th of this month."

Bosch Trade Mark in Suit

NEW YORK, April 24—Robert Bosch Aktiengesellschaft has secured a decision from the examiner of trade mark interferences in the United States Patent Office favoring its appeal for cancellation of the registration by the American Bosch Magneto Corp. of the name Bosch as a trade mark applied to ignition in automotive electrical equipment. Robert Bosch A.-G. claimed that American Bosch had not sole or exclusive use of the name. American Bosch has filed an appeal.

Studebaker Presents Heavy Duty Trucks

New Line is Designed for
High Speed Service—Prices
\$2,410 to \$3,275

SOUTH BEND, April 24—Studebaker Corp. of America is introducing a new fast delivery chassis for heavy freight loads in three types—a Model 75 Junior on 158-in. wheelbase listing at \$2,410; Model 76 Special on 184-in. wheelbase listing at \$2,775; and Model 75 Heavy Duty on 184-in. wheelbase listing at \$3,275. Weights respectively are 4400 lb., 4860 lb. and 5400 lb. These models with the Studebaker ¾ ton at \$925 and the Erskine ½-ton at \$650, complete the Studebaker commercial vehicle line.

The Studebaker 75 engine is used in the new chassis and has been refined to deliver in excess of 90 hp. The chassis are designed to carry loads up to 2½ and 3½ tons at speeds of 25 to 55 miles an hour. Four-wheel, mechanical amplified action brakes are standard. A ventilated disk parking brake 14 in. in diameter is mounted on the propeller shaft directly behind the transmission and operated by a hand lever. Single or dual rear wheel equipment is optional and pneumatic tires are standard.

Frames are of 8-in. pressed steel channel. Engine and transmission are carried in unit in a special steel sub-frame to relieve undue strain. A 3-in. propeller shaft is used. It is a two-piece shaft equipped with three universals, the center universal being supported by a self-aligning doublerow ball bearing. The rear axle housings are malleable iron shaped to provide truss strength. The load is carried on oversized bearings at wheel hubs and differential. Heavy rubber bumper blocks attached at spring pads serve as auxiliary to the springs which are extra long and heavy.

Studebaker Club Sedan \$1,435

SOUTH BEND, April 23—Studebaker Corp. of America has added a club sedan priced at \$1,435 to its Commander line. Body and moldings are dark green with broad belt panel in Deauville sand. Striping is in ivory and wheels are dark green. Upholstery is mohair and rear seats have arm rests on either side.

Auburn Sees Record Month

AUBURN, IND., April 23—Unfilled orders indicate that April sales by Auburn Automobile Co. will be the largest in the history of the company. Production will average 100 daily through the month. Full production is now under way on the 76 models which have been held back by unusual demand for the 115 and 88 types. Export shipments are approximately 25 per cent in excess of the same period last year.

Chrysler Executives Head De Soto Corp.

Fields Named President and
Matheson Director of Sales
—Chrysler Chairman

DETROIT, April 24—Announcement today of the officers of the De Soto Motor Corp. shows Walter P. Chrysler as chairman of the board; Joseph E. Fields, president; Charles W. Matheson, vice-president in charge of sales; B. E. Hutchinson, vice-president and treasurer; F. A. Morrison, secretary; H. A. Davies, assistant treasurer, and L. A. Moehring, comptroller.

All of these officers are identified with the Chrysler Corp., Mr. Matheson joining the organization recently to fill a position which is now disclosed. For the past year he has been vice-president in charge of sales of the Kelvinator Corp. and previously was vice-president in charge of sales of Oakland Motor Car Co. and of Dodge Brothers, Inc. Mr. Fields is vice-president in charge of sales of Chrysler.

The De Soto Corporation will function as a division of the Chrysler Corp. and the officers continue their official capacities with Chrysler.

Directors in addition to Mr. Chrysler, Mr. Fields, Mr. Matheson and Mr. Hutchinson include W. L. Mitchell, Fred M. Zeder and K. T. Keller, vice-presidents of the Chrysler organization.

Commenting on the new car, Mr. Fields said:

"The De Soto Six will bring to motorists an entirely new conception of value in the moderate priced six-cylinder field. It will have the advantages of Chrysler's background and experience in designing, engineering and manufacturing."

Chrysler of Canada Builds

WINDSOR, April 23—John D. Mansfield, president and general manager of the Chrysler Corp. of Canada, Ltd., reports that work has been started on an addition to the company's plant which with equipment is to cost about \$200,000. With its completion about May 15, capacity will be 200 cars daily, double that of last year. The addition will provide accommodation for the sheet metal and enameling plant.

To Offer New Heat Indicator

NEW YORK, April 21—The Moto Meter Co., Inc., will soon introduce a new illuminated automobile heat indicator of the radiator type. The new indicator will be more ornamental than former models and will be adaptable to every car. The illuminated feature will be produced by a small radio bulb.

Moves Pittsburgh Office

ST. PAUL, April 21—American Hoist & Derrick Co. will move its Pittsburgh office on May 1 to 604 Chamber of Commerce Bldg.

Studebaker Ships Direct to Spain

DETROIT, April 24—Studebaker Corp. of America will ship a full boatload of cars from Detroit direct to Spain by steamer in May, via the St. Lawrence route. The S. S. Hamburg has been chartered for the shipment which will include both boxed and unboxed cars. By using this shipping method the company expects to effect a saving of \$20 to \$40 a car for dealers.

General Motors Export Now Employing 14,000

NEW YORK, April 25—Less than 5 per cent of the overseas personnel of General Motors are Americans, Harry S. Tipper, general sales manager for the General Motors Export Co., told the Export Managers' Club at the Hotel Pennsylvania last night. In his address which preceded the showing of the film, General Motors Around the World, he pointed out that employees abroad have increased from 321 in 1921 to more than 14,000 in 1928.

Consistent with the spirit of the film, Mr. Tipper told how the introduction of the motor car and improved roads in various areas of the world have done much to improve the economic condition of the inhabitants of these other countries.

"Until the coming of the motor car and truck," he said, "these areas were dependent upon the kind of transportation that had been in existence for ages. Their economic position was generally the same as it had been for hundreds of years, the celerity of interchanging people and commodity which is the most vital factor in increasing the speed of business was practically absent from these important areas."

Ford Delays Omaha Branch

OMAHA, April 26—Omaha branch of Ford Motor Co. which was to have begun assembling new Ford cars on April 22 will not begin work on the new models until the arrival of Detroit factory officials, which may not be until early next month, W. A. Russell, plant manager, said.

Nice Starts New Unit

PHILADELPHIA, April 23—Nice Ball Bearing Co. has started construction on a factory addition which will cost with equipment \$150,000. The new building will be one story in height and will be ready for manufacturing within several months.

Names Western Representative

HARTFORD, CONN., April 23—Billings & Spencer Co. have appointed W. R. Voorhees & Co., San Francisco, as representative on the Pacific Coast and in the Rocky Mountain territory.

9 Ohio Cities Show 37% Gain in March

Increase to 8987 is Compared
With 6596 in February—
Cleveland Leads

COLUMBUS, April 23—The Ohio Council, National Automobile Dealers Association, has issued figures of sales of new cars in nine of the most populous counties in Ohio for March which show an increase over sales during February. New car sales for March totaled 8987 as compared with 6596 in February, a gain of more than 37 per cent.

The record of new car sales in Cuyahoga county, including Cleveland, for March was 3219, against 2303 in February; in Hamilton county, containing Cincinnati, 1240 sales in March against 1026 in February; in Lucas county, including Toledo, 1035 sales in March against 620 in February; in Franklin county, containing Columbus, 817 sales in March against 781 in February; in Summit county, containing Akron, 737 sales in March against 514 in February, and in Stark county, containing Canton, 518 sales in March against 632 in February.

California Sales Gain 35%

SAN FRANCISCO, April 23—Considerable improvement in retail sales for the first half of April is reported by dealers here and in other cities of the San Francisco territory. It is estimated by these dealers and by officials of the Motor Car Dealers' Association that sales from April 1 to 15, 1928, will be 25 per cent better than those for the same period last month, and about 35 per cent better than those for the same 15 days a year ago. General business in this territory is improving and collections are materially easier.

90% of Sweeney Students Seek Aviation, Says Head

KANSAS CITY, April 24—The Sweeney Building, home of the Sweeney Automotive, Aviation and Electrical School, one of the largest and oldest automotive schools in the United States, has been sold. E. J. Sweeney is president of the school. The building was purchased by a group of Kansas City business men for \$875,000. The Sweeney Radio Station, WHB, one of the largest stations in the Middle West, was included in the transaction.

Mr. Sweeney, in announcing the sale, said that 90 per cent of his students now desire to study aviation and that the building was not fitted for that purpose. He will start the erection of a \$60,000 aviation school building at once. It will be erected at his airport on the Kansas side. His automotive and electrical school will be housed in the old Studebaker Riley Building, Twenty-first and Grand.

Fuller & Sons Passes to Unit Corporation

Milwaukee Organization Adds
Company to Obenberger
Forge and Dallmann

MILWAUKEE, April 21—Another step in the \$7,000,000 consolidation program undertaken by the Unit Corp. of America, Milwaukee, is the acquisition of Fuller & Sons Co., Kalamazoo, one of the oldest manufacturers of automotive transmissions and gears in the United States. The other concerns in the merger are the Obenberger Forge Co., Milwaukee, and the Dallmann Machine & Mfg. Co., also of Milwaukee. A fourth concern contemplated in the consolidation is a Wisconsin company manufacturing gas engines, but the identity of it has not been disclosed.

The Unit Corp., when its plan is completed, will be the first concern in the country turning out engines, transmissions and differentials for automobiles, trucks and tractors and also for general manufacturing industries.

The Fuller transaction is being financed by the sale of 110,000 shares of no par preferential stock of the Unit Corp., which has just been placed on the market at \$28.50 per share, or a total of \$3,135,000.

The Unit Corp. operates in the former Obenberger plant, which covers 3½ acres and has 5½ acres for future expansion. W. H. Schmidt is president; E. W. Edwards, vice-president; P. O. Dallmann, secretary, and George C. Moerschel, treasurer.

Racine Screw to Resume With Change in Personnel

RACINE, WIS., April 21—The Racine Screw Works, Racine, Wis., a large manufacturer of automatic screw machine products, which has been idle since fire destroyed its plant on Feb. 25, causing an estimated loss of nearly \$200,000, is preparing to resume production. The business is being reincorporated, having undergone a change of personnel. Jerome J. Ritter has withdrawn. Albert O. Falkenrath will continue as president and other officers will be elected from new interests entering the company. The concern has been in business 20 years and at the time of the fire was in a most flourishing condition, with large contracts and a heavy volume of unfilled orders.

Consolidate Wrench Sales

MILWAUKEE, April 21—The Husky Wrench Co., Milwaukee, manufacturer of chrome alloy steel socket wrenches and tool sets, has entered into a reciprocal sales arrangement with J. H. Williams & Co., Buffalo, considered the largest makers in this field. The arrangement enables each company to merchandise in combination sets its own product and that of the other concern.

Oakland Open House Draws 70,000 Crowd

PONTIAC, April 21—The monster open-house celebration of Oakland Motor Car Co., in observance of the completion of the new Oakland assembly plant attracted more than 70,000 visitors.

Besides inspecting the mammoth new factories the visitors were also privileged to view an extensive automobile show in which all the lines of General Motors were displayed. The Oakland Motor Car Co. brass band provided music for dancing.

An idea of the magnitude of the undertaking can be gained from the fact that 88,000 packets of ice cream, 85,000 sandwiches, 2400 gallons of coffee and 550 gallons of punch were consumed.

Peaslee Gaulbert Sells Paint-Varnish Business

LOUISVILLE, KY., April 21—Greater activity in its automobile supply departments, electrical, radio and other departments is to be shown by the old Peaslee Gaulbert Co., Louisville, as a result of disposal of its large paint, varnish and lacquer business to the Devoe & Reynolds Co., of New York.

This company since 1867 has been in the production as well as distribution end of the paint, varnish and allied businesses. It did a large industrial business with manufacturers of automobiles, furniture and other commodities. The sale of its manufacturing departments, effective May 1, will result in the incorporation of the Peaslee Gaulbert Paint & Varnish Co., which will be a manufacturing and distributing organization, or subsidiary of Devoe & Reynolds.

The old Peaslee Gaulbert Co. will become the Peaslee Gaulbert Corp., and with the parent organization in Louisville and a number of branch houses through the South, will continue jobbing collateral lines as carried in 12 other departments.

Johnsen Specialty Formed

MILWAUKEE, April 21—With the assistance of the industries division of the Milwaukee Association of Commerce, Peter Johnsen, inventor of a Diesel injection system, has formed the Johnsen Engine Specialty Co. of Milwaukee to develop and promote the sale of franchises. The concern also will specialize in marine engines of the Diesel type, and also is engaging in the work of converting tractor and industrial gasoline engines into oil-burning engines by the application of the Johnsen injector system.

Veeder Organization to Merge With Root

Details of Consolidation Nearing
Completion—To Continue Both Plants

HARTFORD, CONN., April 21—A merger of the Veeder Mfg. Co. and the Root Co., of Bristol, this state, is nearing completion by Paine, Webber & Co. The Veeder company, of which Curtis H. Veeder was the founder, has been located here over a generation and first began business in the manufacture of bicycle cyclometers. On removal to its present plant the company also went in for die castings and as time went on added counters of various descriptions. It is announced that both companies will continue to operate their respective plants. The personnel of the new company has been determined as well as certain enlargement plans. A meeting of the stockholders of the Root company is scheduled for this week.

The purchase price of the Veeder company is in excess of \$2,000,000 and that of the Root company between \$500,000 and \$600,000. The sale of the Veeder company has been made possible, it is stated, through the desire of Curtis H. Veeder, the founder of the company, and David J. Post, to retire from active business. By the terms of the sale Mr. Post is to continue with the new company for a year and Mr. Veeder for a longer period.

The plans of Paine, Webber contemplate the issuance of 75,000 shares of stock in the new corporation of no par value. It will all be of one class with no preference shares.

Curtis H. Veeder, president of the Veeder company established in 1895, is the inventive genius of the organization, and David J. Post the sales head.

John T. Chidsey, president of the Root company established in 1867, said that the merger would not affect the personnel or the plant of his company.

Baldwin Gets Cab Contract

WASHINGTON, April 25—Award for the furnishing of 275 armored cabs to the Post Office Department has been made to the Baldwin Locomotive Works, Philadelphia, according to announcement of the Post Office Department. The contract bid for the lot was \$103,400, the department stated. The cabs are to be used on chassis already owned by the government, and as a protection against bandits in the transportation of valuable mail.

Gulf Adopts Westinghouse

PITTSBURGH, April 23—Westinghouse Air Brake Co. reports receipt of an order from the Gulf Refining Co. for equipment of its entire fleet of more than 2000 tank trucks with the Westinghouse vacuum type brakes.

M. & A.M.A. Reports Record March Sales

Heavy Original Equipment
Business Brings Total Above
October, 1925, Mark

NEW YORK, April 25—The automotive parts and accessory industry had in March the greatest month in its history and has excellent chance of making the first half of 1928 a record six months. Makers of engines, bodies and other parts and accessories for original equipment of cars and trucks reported shipments in March far ahead of February and of March last year and exceeding the pace of October, 1925, which had held the record, according to compilations of the Motor & Accessory Manufacturers Association.

The heavy volume of original equipment business, prompted by the extensive operations of car and truck makers was supported by a large March distribution through the wholesale trade of parts, accessories and garage machinery and tools. The three latter classifications did not establish new records in March but business was substantially greater than in January and February and well above any average month of recent years.

April production schedules indicated only a slight falling off from March and orders on hand promised no more than an orderly seasonal decline until mid-year.

Equipment Index Reaches 231

Original equipment shipments in March of a large, representative group of M. & A.M.A. members aggregated 231 per cent of the base index figure. This compared with 187 per cent in February, 195 per cent in March last year and 214 per cent in October, 1925, the previous peak month. Much of this equipment probably went into cars and trucks manufactured in April.

Therefore, with expected seasonal curtailment of vehicle output in May, unit parts makers' schedules for April were slightly under March and further declines were anticipated in May and June. In a confidential survey of original equipment makers, however, the M. & A.M.A. learned that the second quarter's curtailment would apparently be so slight that, with a record first quarter, the half year would surpass any previous similar period.

Replacement parts makers selling through the wholesale trade also had a busy March, their shipments aggregating 136 per cent of January, 1925, as compared with 128 per cent in February and 120 per cent in March last year. A number of representative service parts makers have predicted a record half year and, according to present indications, the greatest year this division of the industry ever had.

Accessory sales through the trade, which have not been up to previous

March Excise Tax Increases \$1,488,270

WASHINGTON, April 25—A total of \$5,971,356 was collected in excise taxes from the automobile industry during March, according to figures just announced by the Internal Revenue Bureau. This was an increase of \$1,488,270 over the March, 1927, collection, which totaled \$4,483,094. Total automobile excise tax collections for the first three-quarters of the present fiscal year, which began July 1, and ended March 31, were \$41,046,991, a decrease of \$5,874,230.86, compared with the previous nine months.

years' levels because of greater adoption of standard equipment accessories, aggregated 113 per cent of January, 1925, as compared with 91 per cent in February and 135 per cent in March last year.

Service Equipment 174

Garage machinery and tools in March continued the gain begun in January. Aggregate shipments were 174 per cent of January, 1925, as compared with 158 per cent in February and 210 per cent in March last year. This division of the business has not advanced as rapidly as it did a year ago, when Ford dealers who were then selling new cars in considerable quantities were substantial buyers of service equipment.

With original equipment business setting a new record and trade sales at substantially high levels, the grand index of all March shipments of reporting M. & A.M.A. members was 207 per cent of January, 1925, as compared with 171 per cent in February and 181 per cent in March last year. The previous high grand index of M. & A.M.A. reports was 188 per cent in October, 1925.

Auburn in Production on 3 Cabriolet Models

AUBURN, IND., April 21—Production of a new cabriolet model on all three Auburn chassis is now under way. The new model will list at \$2,195 on the 115 chassis; \$1,695 on the 88 and \$1,395 on the 76. The new car is a combination of the open and closed styles. A folding top makes the car either a coupe or a roadster. Windows may be set flush with the doors or left raised while the top is down.

The cabriolet has a dust-proof top of extra heavy material, straight type windshield, and nicked window frames and top bows. The corner posts, which are quite narrow, also are nicked. Upholstery is of leather in optional shades. Equipment is complete, the same as on all other Auburn models and most of the cars will be built with wire wheels.

Tire Dealer Stocks Higher Than in 1927

Survey by Department of Commerce Shows Decline,
However, in Total

NEW YORK, April 21—Individual tire dealers throughout the United States are carrying a larger stock of tubes and casings per dealer than they were a year ago, although total stocks are considerably lower than at that time, according to the preliminary results of the semi-annual survey conducted by the rubber division of the United States Department of Commerce.

On a percentage basis, there are fewer dealers carrying stocks of less than 50 casings with a proportionately larger number carrying stocks of 50 or more casings. The average number of casings of all types per dealer, as of April 1, according to the 22,583 reports received to date, was 78.9, an increase of 8.3 over a year ago and of 15 over two years ago.

The comparative figures on total stocks as of April 1, 1928, and April 1, 1927, are as follows:

	1928	
	Stocks	Dealers
Casings, all types.....	1,782,324	22,583
Casings, balloons.....	649,115	16,173
Tubes	2,877,639	23,744
Solid and cushion.....	36,613	1,103
	1927	
	Stocks	Dealers
Casings, all types.....	2,604,432	36,865
Casings, balloon.....	868,312	24,431
Tubes	4,370,989	36,196
Solid and cushion.....	44,868	1,817

Inventories of Tires Higher on March 1

NEW YORK, April 21—Inventories of pneumatic casings of all types, as of March 1, showed a marked increase, due both to increased production and to decreased shipments, according to statistics just made available by the Rubber Association of America, Inc. The same condition holds true of inner tubes of all types. Shipments of both casings and tubes for balloon tires showed increase.

Comparative figures follow:

	Inven- tory	Produc- tion	Ship- ments
	Balloon	Casings	
Feb. 1928....	4,173,493	3,021,548	2,500,013
Jan. 1928....	3,656,537	2,377,299	2,489,391
Feb. 1927....	3,244,752	2,017,711	1,886,975
	Balloon	Inner Tubes	
Feb. 1928....	5,046,021	3,221,756	2,602,362
Jan. 1928....	4,408,235	2,411,124	2,539,535
Feb. 1927....	4,200,796	2,251,634	2,012,852
	High Pressure	Cord Casings	
Feb. 1928....	4,394,561	1,697,498	1,244,812
Jan. 1928....	3,605,064	1,684,750	1,496,047
Feb. 1927....	4,376,726	1,696,973	1,377,080
	High Pressure	Inner Tubes	
Feb. 1928....	5,941,626	1,949,539	1,470,668
Jan. 1928....	5,238,071	1,669,894	2,014,744
Feb. 1927....	7,835,951	1,992,539	1,827,342

Men of the Industry and What They Are Doing

Durant Sees Continuance of Industrial Prosperity

William C. Durant before sailing to Europe on a visit of six weeks issued a statement in which he expressed optimism as to the continued prosperity and rising stock values of industry in this country. He pointed particularly to the widely owned large corporations, such as General Motors, American Telephone & Telegraph, General Electric, United States Steel and American Smelting & Refining Co. as examples of what industry, properly organized, can establish in the way of real values.

"Speaking of General Motors," he said, "I predict that the earnings of that great company in 1932 applicable to the common stock will approximate \$400,000,000. I also predict that time money will be available at 3 per cent. If I am right in my conjecture and General Motors continues to distribute 60 per cent of its earnings, or practically \$14 a share, the investor would receive a 5 per cent return at \$280 per share."

Desroziers to Visit U. S. Plants

Engineer Desroziers, a French specialist on clutches and president of the JED Clutch Co., of Paris, sailed for New York on the De Grasse, April 28 and expects to remain in the United States during May and June. Mr. Desroziers is completing arrangements for the placing of the JED clutches, one of the features of which is direct molding of friction material on steel, on the American market. He intends to visit the leading American factories.

Chase Leaves Niles-Bement-Pond

The resignation of Marcus Chase, sales manager of the Niles-Bement-Pond Co., is announced. Mr. Chase is leaving active service after 29 years of continuous service with the company, the last 17 of which he was manager of the Boston office. He is succeeded by M. S. Bradley, who has been an assistant to Mr. Chase for nearly 15 years.

Sigwalt Joins Cramer-Krasselt

Harold P. Sigwalt, formerly advertising manager of the Federal Motor Truck Co., Detroit, and for five years in charge of Milwaukee Corrugating Co. publicity, has resigned to accept the position of director of the industrial advertising division of the Cramer-Krasselt Co., Milwaukee.

Shaw Crane Promotes Zachau

Eric Zachau has been named general manager of the Shaw Crane Division of the Shaw Crane-Putnam Machine Co., of Muskegon Heights, Mich. The position was recently created and Mr. Zachau, who will remain in Muskegon, will have the entire supervision of the Muskegon Heights plant.

Ford Misses Visit With British Ford

Henry Ford paid a surprise visit to the plant of Morris Motors, Ltd., during the course of his present visit to England. W. R. Morris, head of the company, was not present as he did not know that Mr. Ford was coming. In conversation with other officials, Mr. Ford said he would have been sorry to see any decrease in British competition as he regarded Great Britain the center of the Old World. He watched the making of Morris cars and seemed surprised at the size of the plant and its efficiency.

Dieckelman Vice-President

The Pressed Steel Tank Co., Milwaukee, manufacturer of Hackney steel barrels, acetylene tanks, etc., has announced the promotion of R. P. Dieckelman, secretary, to vice-president, and of Herman Merker, sales manager, to be also secretary. Both have been associated with the concern for many years. Herman O. Brumder is president, and F. Trevor Boundy, treasurer.

Chandler Talks on Steering

F. F. Chandler, vice-president and chief engineer of the Ross Gear & Tool Co., Lafayette, Ind., was the guest of honor of the Milwaukee Section, S. A. E., at the April dinner meeting. He spoke on "Steering Problems."

Tjaarda Rejoins Locke

"J. Tjaarda, who arrived in New York on March 25 from a six months' trip in Europe, has returned to Locke & Co., as chief designer, and will have his headquarters in Rochester.

Lycett Chicago Manager

F. W. Lycett has been appointed manager of the Chicago branch of the Locomobile Co. Mr. Lycett comes to Chicago from the Locomobile factory, where he was district manager for more than two years.

Moon Appoints Craighead

N. D. Craighead, formerly advertising manager for the St. Louis Star, has been appointed publicity man for Moon Motor Car Co. He will handle publicity and advertising.

Helmel Named Director

W. B. Helmel has been elected a director of Motor Products Corp. in place of R. R. Seeley. Other directors have been reelected.

Studebaker Names Streets for Veteran Employees

As permanent memorials in recognition of long and loyal service with the Studebaker Corp. of America, eight entrance gates and 10 main streets of the company's factories in South Bend have been named after veteran employees. Among the 18 men so honored, the average length of service was 41 years. All but one of these men worked with the five original Studebaker brothers, many of them toiling at bench and forge side by side with the founders.

The eight men after whom gates were named and the length of time they served Studebaker follow: A. W. Peak, 56 years; Joseph Black, 62 years; E. Duffield, 49 years; J. Komasinski, 45 years; Adolph Wolter, 52 years; O. S. Deal, 46 years; A. J. Raabe, 53 years, and James J. Armour, who was superintendent of the Studebaker foundry for 11 years. Of the eight men honored, Mr. Raabe is the only one still in active service. Messrs. Duffield and Wolter are still living and receiving a Studebaker pension.

The factory streets were named after the following men: G. F. Collmer, 44 years; G. Bernhard, 52 years; A. R. Sackman, 44 years; William Pickens, 40 years; I. Hogue, 49 years; J. Klaybor, 49 years; G. Schulz, 50 years; J. Iwan, 44 years; G. Cutkowski, 49 years, and R. E. Paige, 43 years. Messrs. Bernhard and Paige are still in active service with the corporation. Of the above all are living and receiving a pension except Mr. Sackman.

Crosby Heads Lansing Buyers

New officials of the Lansing Purchasing Agents Association are: L. M. Crosby, of the Dail Steel Products Co., president; C. R. Morris, Michigan Screw Co., vice-president; S. S. Bennett, Capital Casting Co., treasurer; Clifford C. Garlock, VanDervoort Hardware Co., secretary. Directors are Willard N. Sweeney, purchasing agent of the Michigan State College; C. A. Morse, Reo Motor Car Co.; A. C. Pratt, Duplex Truck Co., and L. P. Slivenski, of the Fisher Body Corp.

Hunt in Patent Division

J. H. Hunt, formerly engineer of the Chevrolet Motor Co. and past president of the Society of Automotive Engineers, has been transferred to the General Motors Corp. patent division.

Post Pittsburgh Manager

W. H. Post has been appointed manager of the Pittsburgh branch office of the Timken Roller Bearing Service & Sales Co. Mr. Post has been active in sales work in the Cleveland district.

G.M. Quarter Profit Increases \$16,917,168

Total for Period \$69,468,576
Compares With \$52,551,408
in 1927 Period

NEW YORK, April 24—General Motors Corp. reports net profit for the first quarter of the current year as \$69,468,576. This compares with profits for the same period a year ago of \$52,551,408 and is equivalent to \$3.86 a share on outstanding common stock, as compared with \$2.90 a share on a comparable basis a year ago. After preferred and debenture dividends, net profit is \$67,117,657. Cash and government and marketable securities on hand on March 31 were \$160,068,830 as compared with \$111,257,108 on March 31, 1927.

Truck Production Gains 412%

DETROIT, April 23—According to O. L. Arnold, vice-president and director of sales of General Motors Truck Co., production during the first quarter showed a gain of 412 per cent compared with the corresponding period of 1927. Production of General Motors trucks during the past 30 days have been on a schedule of 120 units daily, he said, and advance orders indicate that this record production must be increased.

President Paul W. Seiler stated that production of Yellow parlor coaches is now proceeding at the rate of five a day. Production in this division will be stepped up as soon as the manufacturing division for this department is transferred from Chicago to Pontiac. Manufacture of Yellow taxicabs is still being carried on in Chicago but this department will be moved to Pontiac in the next 30 or 60 days.

Discuss Material Handling

PHILADELPHIA, April 25—All phases of the mechanical handling of materials were fully discussed by the materials handling division of the American Society of Mechanical Engineers which closed its first annual meeting here last night. Interspersed with the papers and discussions were visits to local plants where various mechanical handling installations were seen in operation. The meeting was well attended with a number of automotive executives present.

Pressed Metal Institute Meets

BUFFALO, April 21—The first business meeting of the Pressed Metal Institute was held in Toledo, April 12. H. C. Dunn of the domestic commerce division of the U. S. Department of Commerce, addressed the meeting on the services of trade associations as discovered by the department in its preparation of Trade Association Activities.



Leon R. German

Newly elected president of Peerless
Motor Car Corp.

Miniger Monroe Director, Gets Toledo Plant Space

MONROE, MICH., April 23—C. O. Miniger, president of Electric Auto-Lite Co., has been elected a director of the Monroe Auto Equipment Co., Monroe, Mich., following acquisition of a substantial stock interest in the company. A statement by C. S. McIntyre, president of the Monroe company, said Mr. Miniger expected to identify himself actively with the further introduction of Monroe hydraulic shock eliminators to the equipment and replacement market.

A second addition this year to the Monroe plant, contracts for which have just been awarded, will provide capacity for 500,000 sets a year. Arrangements also have been made for the building of Monroe hydraulics in the Electric Auto-Lite plant. This will provide facilities for a second 500,000 sets when necessary.

Acquires Hoist Division

CLEVELAND, April 23—Columbus McKinnon Chain Co. has acquired control of the hoist division of the Chisholm-Moore Mfg. Co., this city, but the general sales offices and factory will continue to operate in the same location and under the same name. S. H. Moore will continue with the organization and the personnel as a whole will remain unchanged.

Buick to Erect Warehouse

CHICAGO, April 23—Leasing for 20 years 309,000 sq. ft. of industrial property in the clearing industrial district, the Buick Motor Co. will erect a one-story warehouse. The lease contains options of purchase and the company is also given an option on 160,000 sq. ft. adjoining at the south. Approximately \$1,000,000 in rental is involved. The building is to be completed by July 1.

Financial Notes

Graham-Paige Motors Corp. and subsidiaries for the quarter ended March 31, report net profit of \$257,783 after charges and depreciation, equivalent after allowances for preferred stock dividends to 15 cents a share earned on 1,052,926 shares of no par common stock. This compares with net loss of \$185,798 in the first quarter last year. Joseph B. Graham, president, said net earnings in March were \$404,786 after depreciation. Output in the first quarter totaled 13,132 cars of which 7616 were produced in March. April output is at higher levels, the first 19 days showing 5275 production against 4234 in the first 19 days of March.

Packard Motor Car Co. reports net income of \$12,538,492 for the seven months ended March 31, equivalent to \$4.17 a share on the 3,004,264 shares of \$10 par capital stock outstanding. This compares with \$6,910,153, or \$2.30 a share, in the same period last year. For March the net income was \$2,397,936, comparing with \$1,001,114 in March last year.

Doehler Die Casting Co. reports net profit of \$204,725 for the quarter ended March 31, comparing with \$127,967 in the same period last year. Sales totaled \$2,030,257, compared with \$1,796,388 in the first quarter of 1927. Outstanding stock on Dec. 31 last consisted of \$1,000,000 preferred, \$512,950 preference stock and 150,000 shares of no par common stock.

Hudson Motor Car Co. reports net income after all charges for the first quarter of the current year as \$4,207,372. This is equivalent to \$2.63 a share on the common stock and compares with \$4,026,515, or \$2.52 a share, for the corresponding quarter last year.

Caterpillar Tractor Co. has declared regular quarterly dividend of 20 cents payable May 25 to stockholders of record May 15. Returns for the first quarter of the current year before Federal taxes were \$1,481,233. This is equivalent to 91 cents a share and compares with \$1,438,023, or 88 cents a share, for the corresponding period a year ago.

General Electric Co. reports net profit for the first three months of 1928 as \$11,261,842 compared with \$11,028,143 for the same period a year ago. This is equivalent to \$1.56 a share as compared with \$1.53 a share last year. Net sales were \$71,640,790 as compared with \$72,474,474 a year ago.

Federal Motor Truck Co. has declared usual quarterly stock dividend of 2½ per cent and a cash dividend of 20 cents payable July 5 and July 2, respectively, to stockholders of record June 16.

C. G. Spring & Bumper Co. has voted to pass the dividend on common stock due May 15, due to the necessity of conserving working capital because of unusually heavy production volume at this season.

Midland Steel Products Co. reports profits for the first quarter totaled \$630,551 before Federal taxes, against \$603,048 before taxes, in the first quarter of last year.

Bay State Collects \$14,211,337 Insurance

Year of Compulsory Law
Shows Need of Revisions—
Many Evasions Practised

BOSTON, April 21—Premiums paid by motorists of Massachusetts under the Compulsory Insurance Law during 1927 totaled \$14,211,337, according to figures compiled by the Massachusetts Automobile Rating & Inspection Bureau. Losses paid were \$7,474,396. But the insurance officials say these latter figures do not mean much because the complete returns will not be in for some months, due to many causes remaining unsettled.

The figures available to date seem to explode the claim that only about 30 per cent of owners carried insurance. The 1927 premiums compared with the 1926 figures show that between one-half to two-thirds of the owners must have carried liability coverage in the Bay State.

According to the insurance officials, the new law has cost the companies a lot of money, claiming that the average ratio loss indicated by the figure will be as high as 62 per cent. Insurance Commissioner Wesley E. Monk states frankly that some of the companies have not played fair and changes have had to be brought about. Some of these things have resulted in curious situations.

One of the most irritating experiences was in connection with the owner of a fleet of trucks who found that suddenly all his policies had been cancelled. Evidence before the board of appeal showed that the insurance company had made excessive charges for extra-territorial coverage to balance the low rate for liability under the compulsory manual. The board forced the company to reinstate the policies.

Uses Garage in Country

Another truck owner, by garaging his trucks 10 miles out of the city each night obtained the lower rate for country insurance. He saved enough money to pay for the land and cost of a new garage. Juggling with undertakers' cars was another angle. It was learned that owners of liveries could save considerable insurance by rating them as cars for undertakers. Many were thus insured at \$50 instead of \$200. This has been stopped.

The board of appeal had 156 complaints last year. Of these 36 cancellations were deemed unreasonable and were ordered reinstated. There were 28 cancellations allowed. These figures show that the statement, before the law went into effect, that cancellations would remove hundreds of drunken drivers, is not borne out. There were 51 cases withdrawn, 10 were defaulted and 22 were adjusted without a hearing.

Guayule Tire Test Made in California

SAN FRANCISCO, April 21—The first tires to be produced from the first guayule plantation in California have been installed on a car for practical use. The tires are 31x5.25, four-ply balloons, and have been given the trade name "Ampar." They are to be driven until worn out and an accurate mileage record is being kept. The guayule farm is an experimental plant of about 2400 acres, established and operated by the International Rubber Co. Five years are required to produce a crop of rubber, and, with alternate plantings, starting five years ago, it is estimated that in 1931, the plantation will be in full bearing. Meanwhile, 3000 other acres are being planted to the shrub.

Oshkosh Reorganization Waits Bondholder Action

OSHKOSH, WIS., April 21—Proposed reorganization of the Oshkosh Motor Truck Mfg. Co., Oshkosh, Wis., has been delayed by the lack of a quorum at a joint meeting of bond and stockholders to consider a plan worked out by W. G. Maxcy, Oshkosh capitalist and at present receiver of the company. Mr. Maxcy now will summon a meeting of bondholders to determine a course of action. Notice of their decision is then to be communicated to the stockholders, numbering 2300 persons. Mr. Maxcy said that the concern is forging ahead but cannot get on a firm financial ground because of the handicap of the receivership and lack of adequate working capital. His plan is to issue \$225,000 of new 7 per cent stock, of which \$75,000 would go to the bondholders and \$150,000 worth sold to stockholders, the old stockholders having first choice. Then \$75,000 worth in addition would be authorized but not issued, as a reserve or as a bonus for a manager.

New Airship Bids Asked

WASHINGTON, April 25—Calls for new bids for the construction of a rigid airship of approximately 6,000,000 cu. ft. capacity have just been announced by the Navy Department. The bids will be opened on July 26. The call for new bids was made by the department following applications of the American-Browne-Boveri Electric Corp., Camden, N. J., which requested that it be permitted to bid for the construction of one or both of the two projected Navy dirigibles. Previously, the Goodyear Zeppelin Co. had won the \$50,000 naval design competition, but was not awarded the contract because appropriations were not available.

Balkan Nations Buy 11,820 Cars in 1927

Seventy Per Cent of Sales of
American Origin—Peasant
Market Grows

WASHINGTON, April 21—The countries of southeastern Europe are steadily increasing their purchases of American motor equipment, according to a report to the Department of Commerce from Trade Commissioner Kelly in Paris. Sales of American cars and trucks already exceed those of foreign competitors in Rumania, Turkey, and Greece, and it is estimated that by the end of 1928 the greater number of sales in Bulgaria and Jugoslavia will be American. The total volume of cars and trucks sold during 1927 in the five countries is estimated at 11,820, of which 8220, or about 70 per cent, were of American origin.

"Probably the most significant fact in this situation is the high total of sales last year in proportion to registrations. Registration of cars and trucks at the end of 1926 totaled approximately 46,475. New sales in 1927 amounted to 25 per cent of this number," Mr. Kelly reported. He said further:

"In this generally optimistic outlook for the coming year, two or three factors are particularly prominent. The first is the growth of the 'peasant' market which at the end of 1927 already accounted for the bulk of sales in eastern Europe.

"A second favorable factor is the movement for good roads. The Government of Greece is considering the letting of a \$30,000,000 contract to private interests for the construction or improvement of about 1000 miles of highways, which will be operated under the toll system."

Spanish Registrations Grow

WASHINGTON, April 25—American manufacturers of automobiles are supplying approximately 55 per cent of Spain's total consumption, according to a cable to the Department of Commerce. Registrations for the first quarter of this year totaled 6400 compared with 5100 registrations the first quarter of last year.

Marko Battery Reorganized

NEW YORK, April 21—Marko Storage Battery Co., Inc., Brooklyn, has been reorganized as the Marko Storage Battery Corp. Paul M. Marko, Sr., who has been president for 21 years, has retired from active service and is succeeded in the presidency by his son, Paul M. Marko, Jr. Other officers are as follows: J. K. Gould, vice-president in charge of operations; Daniel Burkhardt, treasurer, and Thomas Brady, secretary and sales manager. No change in sales policy is contemplated.

Industry Maintains Heavy Steel Demand

Shipments Continue in Large
Volume But Prices Show
Easier Tone

NEW YORK, April 25—Shipments of rolled steel products to automotive consumers continue in large volume but there are few new transactions that involve negotiations between buyers and sellers. With the market for full-finished automobile sheets back at 4 cents, the line between old and new business is really effaced. Consumers' specifications and shipping instructions, frequently telephoned or telegraphed, run heavy both in numbers as well as in tonnage.

Blue annealed sheets, the base price for which remained at 2.10 cents, Pittsburgh, for some time after black sheets had given way to the extent of \$2 to \$3 a ton, are easier in sympathy with the rest of the sheet market and are now virtually on a 2-cent basis. Parts makers continue to call for heavy shipments of hot-rolled strip. Cold-finished fender strip stock is steady at 4.15 cents, Pittsburgh or Cleveland. Non-integrated finishing mills are calling for good-sized tonnages of sheet bars and billets. Market prices for these semi-finished descriptions of steel are largely nominal, contracts being rather flexible and predicated on sheet market conditions.

Cold-finished steel bars are steady but producers complain that parts makers are holding tonnages down to their nearby requirements. In the market for automotive alloy steels very orderly conditions prevail. Producers have a fair backlog of orders and the movement is largely one of routine shipments. Automotive plants appear to be well covered on bolts and nuts, and fresh buying is light. Automotive consumption continues to account for a good deal of the activity in the tool steel market.

Pig Iron—Automotive foundries continue to take in round tonnages of pig iron on account of contracts previously closed. The Michigan market rules firm at \$18.

Aluminum—A good deal of aluminum is being bought in small lots for immediate shipment but in the aggregate this business is sensed to involve a large tonnage. Contracting for second-half shipments is rather slow. The market is steady and entirely unchanged.

Copper—Demand from domestic consumers is somewhat improved, and a slightly better feeling prevails as a result. Producers are asking 14½ cents for Connecticut delivery and 14½ cents for metal delivered in the Middle West. Brass mills have a fair quota of automotive business.

Lead—Storage battery manufacturers appear to be fairly well covered and are not figuring very prominently just now in the market, which is moderately active.

Zinc—Producers of ore as well as smelters are still wrestling with the problem of preventing the market from being glutted.

Aeronautic Exports \$1,903,560 in 1927

WASHINGTON, April 21—Exports of American aeronautic products during 1927 totaled \$1,903,560, representing an increase of 85 per cent over the exports of 1926, and 143 per cent over those of 1925, according to revised figures just compiled by the Department of Commerce. A total of 63 crafts were exported, valued at \$848,568, the remainder of the exports being accounted for in spare parts. The exports, in the main, went to 12 countries, which took approximately four-fifths of the entire export business. The leading country was Canada, which purchased 50 of the 63 complete planes and which also took \$367,003 worth of parts.

Rules 40% Duties on Cotton and Air Springs

WASHINGTON, April 25—Two customs decisions, of interest to the automotive industry, have just been announced by the U. S. Customs Courts. One provides that cotton batting or cotton felting used in stuffing mattresses, automobile cushions, automobile upholstery, etc., is dutiable as cotton not specifically provided for, at 40 per cent ad valorem.

The second decision is that imported automobile air springs are correctly taxed upon entry at the rate of 40 per cent ad valorem, under paragraph 399, of the Tariff Act of 1922, as manufacturers of metal not specially provided for. Claims for duty at 25 per cent ad valorem, under paragraph 369, as parts of automobiles, or at 30 per cent under paragraph 372, as parts of machines, not specifically provided for, were denied by the court.

Rubber Prices Lower

NEW YORK, April 23—Further recessions in crude rubber prices were reported last week. According to F. R. Henderson Corp., advices from London indicate that producers are tackling the problem raised by the removal of restriction of rubber in a business-like manner, urging that increase of production take place gradually and in the first grades only.

General Tire Sales Gain 78 Per Cent

AKRON, April 23—General Tire & Rubber Co. reports increases of 28 and 40 per cent in sales and tire production respectively for the first three months of the fiscal year. Sales passed well over the \$6,000,000 mark. Plant additions, new machinery and increased shipping facilities have made possible an orderly increase in production.

I.C.C. Recommends Federal Bus Bill

Reports No Action on Truck
Measure—See One-Year
Grandfather Clause

WASHINGTON, April 23—Culminating its investigation begun June 15, 1926, the Interstate Commerce Commission this week recommended to Congress Federal legislation for the control of motor buses operated interstate. At the same time, the commission reports that the transportation of property by motor trucks at the present time should not be made the subject of interstate regulation.

The report is similar in character to the provisions contained in the Parker bill (H. R. 12380), which was introduced March 24, 1928, and which is now pending before the House interstate and foreign commerce committee, of which Representative Parker is chairman.

Simultaneous with the commission's report, the House committee on interstate and foreign commerce announced the appointment of a sub-committee to consider testimony given on the Parker bill, and to report its recommendation to the full committee.

Effect of the Interstate Commerce Commission's report to Congress will likely be that the special sub-committee will rewrite the Parker bill, incorporating in a new measure such provisions as are contained in the report which are considered of merit.

In the main, however, it is expected that the Federal legislation—if any at the present session—will be substantially that contained in the Parker bill, with two exceptions, viz.:

(1) That the bill will authorize the railroads and water carriers to engage in motor bus transportation, permitting, but not compelling, through rates, and

(2) That the so-called "grandfather" clause, will provide that a year's operation before the passage of the bill is to be accepted as prima facie evidence of public convenience and necessity. Under the I.C.C. recommendation this would be one year dating from the date that the present session of Congress started.

Australia Hits Bus Lines

WASHINGTON, April 25—Extension of motor bus service in Australia has received a severe setback, according to advices received by the automotive division of the Department of Commerce. This has been done, the department is advised, by passage of the so-called Victorian motor omnibus act, which is now in effect, the bill being drawn to kill competition with railway and trams. It is causing great losses to bus operators who are now making a strenuous fight for repeal of the law. Details of the act were not supplied.

GM Freight Bill \$80,479,712 in 1927

NEW YORK, April 21—General Motors Corp. paid a freight bill for 1927 of \$80,479,712. This represents transportation charges on incoming raw materials and on about three-quarters of the 1,554,577 automobiles sold during the year, the remainder of these cars being driven away. This freight bill does not represent the total freight bill resulting from General Motors activities, as it is obviously impracticable to compile the freight bill paid by the more than 4600 different concerns from which material is bought.

The number of freight cars required to bring the raw materials into the G.M. plants and carry away the finished automobiles during the past few years is shown by the following table:

	Total Carloads	Freight Charges
1927.....	581,137	\$80,479,712
1926.....	453,666	73,900,000
1925.....	380,704	57,000,000
1924.....	280,051	42,000,000
1923.....	340,337	55,000,000

British Tire Exports Rise

WASHINGTON, April 21—Exports of automobile casings from the United Kingdom to foreign countries during February amounted to 51,197, as compared with 46,695 in January. The leading markets were Argentina, British India, British South Africa, Irish Free State, British Malaya, Italy, Ceylon and Denmark, in the order named. Figures announced by the rubber division of the Department of Commerce were made possible by the purchase of British statistics by the Rubber Association of America, Inc.

Coming Feature Issues of Chilton Class Journal Publications

June 10—A. E. A. Summer Meeting Number—Motor World Wholesale

June 23—Engineering Issue—Automotive Industries

Pierce-Arrow Sells 74 to Four Fleet Operators

NEW YORK, April 21—The Pierce-Arrow Motor Car Co. has sold four large fleets of commercial vehicles, consisting of 74 units and worth over \$350,000 for chassis alone.

The largest of these fleets is for the Pure Oil Co. and consists of 32 units, including five Fleet-Arrow wagons, the next is for R. H. Macy & Co. and consists of 15 Fleet-Arrow wagons and three heavy duty units. The third consists of 12 heavy duty trucks, purchased by the Erie County highway department, and the fourth also is for 12 heavy duty units for the Consumer Rock & Gravel Co. of Los Angeles. This last order was received by air mail on April 16.

Citroen Has Sales School

WASHINGTON, April 25—Announcement that the Citroen Automobile Co., France, has established a 4-months factory training school for its traveling salesmen has been made by the automotive division of the Department of Commerce. The department is advised that 1600 applications were filed with the company following its announcement of the course, but that of this number only 24 have been accepted.

Germany Fixes July for Solid Tire Ban

BERLIN, April 7 (by mail)—The German Government has now published a regulation respecting the use of solid tires which has been pending for some time. All automotive vehicles, the empty weight of which does not exceed 3 tons and all such having six wheels and weighing more than 9 tons, either empty or with load, must in future be provided with pneumatic tires only. All other automotive vehicles may alternatively use either pneumatic or air cushion tires. Trailers also may only have pneumatic or cushion tires. The sole exception to this rule is provided in favor of traction engines used solely in agriculture or forestry.

This enactment will come in force July 1, this year. All old vehicles in use then with tires contravening the new regulations will have to change them by July 1, 1929, while the time of grace for trailers is extended to Jan. 1, 1930.

Hispano-Suiza Wins Race

INDIANAPOLIS, April 21—After 19 hours and 21 minutes, the \$25,000 race between the privately owned Stutz Black Hawk roadster and the privately owned Hispano-Suiza speedster this week was called and awarded to the Hispano. Fracture of a second connecting rod in the Stutz was the reason for the sudden termination of the event.

Vortex Moves Plant

CLAREMONT, CAL., April 21—Vortex Mfg. Co., maker of Pomona air cleaners, has moved its plant from Pomona to its new factory building here.

Calendar of Coming Events

SHOWS

American Electric Railway Ass'n, Public Auditorium, Cleveland...Sept. 22-28
American Society for Steel Treating, Commercial Museum, Philadelphia...Oct. 8-13
Automotive Equipment Association, Coliseum, Chicago...Oct. 22-27
Berlin...Nov. 8-18
Brussels...Dec. 8-19
*Chicago...Jan. 26-Feb. 2
International Aeronautical Exposition, Grand Palais, Paris...June 29-July 15
Layback, Yugoslavia...June 2-11
London, passenger cars...Oct. 11-20
Milan...May 17-31
National Standard Parts Association, Cleveland Auditorium...Oct. 29-Nov. 3
*New York...Jan. 5-12
Oran, Algeria...April 1-May 31
Paris, passenger cars...Oct. 4-14
Paris, trucks...Nov. 15-25
Prague...Sept. 1-9
Rio de Janeiro...May 3-13
Tunis...April 27-May 6
United States Good Roads Show, Des Moines...May 28-June 1
Zagreb...April 29-May 6

*Will have special shop equipment exhibit.

CONVENTIONS

American Electric Railway Ass'n, Public Auditorium, Cleveland...Sept. 22-28
American Society for Steel Treating, Commercial Museum, Philadelphia...Oct. 8-13
American Society for Testing Materials, Chalfonte-Haddon Hall Hotels, Atlantic City, N. J....June 25-29

Automotive Engine Rebuilders Association, Coronado Hotel, St. Louis, June 11-14

Automotive Equipment Association, Grand Hotel, Mackinac Island, June 17-23

Automotive Equipment Association, Coliseum, Chicago...Oct. 22-27

Chamber of Commerce of the United States of America, Washington May 8-11

National Association of Automobile Show and Association Managers, Before-Shows, Drake Hotel, Chicago...July 26-27

National Association of Credit Men, Hotel Olympia, Seattle, Washington...June 11-16

National Hardware Association of the United States, Metal Branch, Copley-Plaza, Boston...May 3-4

National Safety Council, National Congress, New York...Oct. 1-5

National Standard Parts Association, Hollenden Hotel, Cleveland, Oct. 29-Nov. 3

Overseas Automotive Club, Luncheons, Hotel Astor, New York May 10 and June 14

Society of Industrial Engineers, Rochester, N. Y....Oct. 17-19

United States Good Roads Association and Bankhead National Highway Association, Des Moines...May 28-June 1

A. S. M. E.

Cincinnati, Oct. 22-25—Machine Shop Practice.

Cleveland, Sept. 17-20—Fuels. Detroit, June 28-29—Aeronautic Division.

Pittsburgh, May 14-17—Spring Meeting. State College, Pa., June 14-16—Oil and Gas Power.

S. A. E. National

Quebec, Chateau Frontenac...June 26-29

Sectional

Cleveland, May 14—Unstability of Front End.

Detroit, May 7—Mr. Kettering will speak.

Milwaukee, May 2—Fred S. Duesenberg will speak.

Northern Calif., May 10—

Pennsylvania, May 8—The Air-Cooled

Radial Engine for Moderate Priced

Commercial Planes—Capt. Robert

W. A. Brewer.

Southern Calif., May 11—Modern Service

Station and Garage Equipment

for Reducing Cost of Operation

Maintenance and Repairs.

RACES

Altoona...June 16

Belgium...Aug. 12

France...July 1

Germany...July 15

Great Britain...Sept. 22

Indianapolis...May 30

Italy...Sept. 2

Spain...July 29